NATIONAL INSTITUTE OF SIDDHA

TAMBARAM SANATORIUM, CHENNAI - 47

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

CHENNAI - 32

Part-I

Pre-clinical and clinical study on Sarakonraipoo Chooranam for Hepatoprotective Activity in the management of Kamalai (Liver Disease)

Part-II

Pre-clinical and clinical study on Kandha chenduram for Hypoglycemic Activity in the management of Madhumegam (T2 Diabetes mellitus)

(DISSERTATION SUBJECT)

For the partial fulfillment of the requirement to the Degree of

DOCTOR OF MEDICINE (SIDDHA)

BRANCH II - GUNAPADAM

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TRIAL DRUG -I SARAKONRAIPOO CHOORANAM

TRIAL DRUG II: KANDHA CHENDURAM

INTRODUCTION

Siddha system is considered to be one of the ancient system of medicine in the world. Siddha is a complete holistic medical system that has been practiced in India for two thousands of years above.

The siddha system of medicine has derived its name from the word "Siddhi", which means "Perfection" or "Eternal bliss". Siddhi refers to the eight supernatural powers that are attainable by man. Those who attained these supernatural or perfection or Siddhi were called "Siddhars". They realised that if the body could be made strong and perfect, they could get rid of death and diseases.

They have fully investigated and studied the cause and the effects of the diseases and all kinds of drugs, minerals and poisons. They imparted their knowledge for the upliftment of the suffering community.

Panchapootha theory has also been described by Siddhars. The panchapoothas are Akasam or veli (ether), Kaattru or vayu (air), Thee or agni (fire), Neer or appu (water), Nilam or piruthuvi (earth).

Every form of matter has to be considered as panchapoothas in its orgin Vali (வளி) Azhal (அழல்) Iyam (ஐயம்) are the three main Physiological regulators of the body and mind. They are called "Muththathukkal". They remain always in a state of equipoise in healthy individuals. Increase or decrease of one or more will cause disease.

மருந்தென வேண்டாவா யாக்கைக் கருந்திய
தற்றது போற்றி யுண்ணின்.[I]

Generally when a medicine is administrated Siddha Physician prescribes diet regimen according to the nature of the medicine and severity of the disease. This is because over intake or consuming unbalanced and incompatible diet is considered to be the prime causative factor for upsetting the tridhosa balance leading to manifestations of various ailments.

Jaundice originates from the French word “jaune”, meaning yellow. It is a physical sign often characterized by yellowish color of the skin, tissues, eyes, and certain body fluids. It may result when excess amounts of a pigmented substance from old discarded red blood cells (bilirubin) dissolve in the layer of fat just beneath the skin (subcutaneous fat). Jaundice can be a symptom of other health problems also.

Bilirubin is formed when a certain pigment (hemoglobin) in red blood cells breaks down as part of the body's continuing process of replacing old red blood cells with new ones. In normal circumstances this form of bilirubin (unconjugated bilirubin) is converted by the liver into conjugated bilirubin. Conjugated bilirubin becomes a component of digestive fluid (bile), and ultimately is eliminated from the body primarily in the feces. Jaundice occurs with elevated levels of either unconjugated bilirubin or conjugated bilirubin.

Except for the newborn form of jaundice (caused by accumulation of discarded red blood cells), the condition is a symptom of overload or damage to the liver, or inability to move bilirubin from the liver through structures transporting bile (biliary tract) to the intestines. For example, overproduction of bilirubin from the breakdown of red blood cells (after internal bleeding or in bleeding disorders) may overburden the liver with more bilirubin than it can process or conjugate. Because unconjugated bilirubin dissolves in fats but not liquid, this form causes yellowing of the skin (hemolytic jaundice). Jaundice may occur in liver cancer (malignant jaundice) or infectious diseases (infectious jaundice) such as hepatitis or cirrhosis, where the damaged or inflamed liver cells are unable to convert bilirubin to the conjugated form. Obstructive or cholestatic jaundice occurs with blockage of the flow of bilirubin from the liver to the intestines.

Infectious jaundice due to hepatitis can result from varied causes such as bacterial or viral infections, infestation with parasites, chemicals (alcohol or drugs), toxins, or immune diseases. Some forms of infectious hepatitis are transmitted through blood products, eating contaminated food, sexual contact, and other unknown means. Over-consumption of foods containing an orange coloured anti-oxidant pigment (beta-carotene) such as carrots and melons can create a yellowish skin condition called pseudo-jaundice, which generally does not produce other symptoms.[II]

The formulation of "Sarakonraipoo Chooranam" is indicated for Kamalai, in Siddha text, "Gunapadam - Mooligai Vaguppu" by the Author Dr.K.S.Murugesa Mudhaliyar.

Hence the author have selected the medicine "Sarakonraipoo Chooranam" for treating Kamalai (Liver diseases).

AIM AND OBJECTIVE

AIM:

To evaluate the safety and efficacy of "Sarakonraipoo Chooranam" for Hepatoprotective Activity in the management of Kamalai (Liver disease).

OBJECTIVE:

PRIMARY OBJECTIVE:

To evaluate the Hepatoprotective Activity of "Sarakonraipoo Chooranam" in preclinical studies.

SECONDARY OBJECTIVE:

Biochemical analysis

To evaluate the efficacy of "Sarakonraipoo Chooranam" for Hepatoprotective Activity in the management of Kamalai (Liver disease).

Collections of evidences in siddha literature

Collection of evidences in mineralogical aspects.

TLC

Toxicological Study:

- Acute toxicity
- Sub-acute toxicity

Pharmacological Study:

- Hepatoprotective activity
- Antioxidant property

Clinical study

- A pilot study on trial drug

MATERIALS AND METHODS

STANDARD OPERATIVE PROCEDURE:

Collection and Authentication of the raw drugs:

The flower was collected from the forest, Vandalur, Chennai and authenticated by competent authority in HoD of Gunapadam.

Ingredients:

Purified Sarakonraipoo

Purification process:

Purification of Sarakonraipoo (Cassia fistula):[III]

The inflorescence is purified by removing the stalk, sepals, androcieum, gynaecium and foreign particles.

Preparation of the medicine:

The inflorescence of Sarakonrai was pulverized into fine powder by an electric grinder. And then it was sieved by using a fine silk cloth (Vasthrakayam). The fine powder was mixed with milk and backed in a backing pan (Pittaviyal Method). Then it was dried and ultra filtered by a cotton cloth and made into fine powder again. The powder was stored in a clean, dry, air tight glass container.

LABELLING:

Name of the preparation	: Sarakonraipoo Chooranam
Color	: Brownish Yellow
Quantity of the drug	: 14 gm
Dose	: 1gm, bid
Adjuvant/ vehicle	: Milk
Indication	: Kamalai (Liver disease)
Date of manufacturing	: 20/07/2012
Date of expiry	: 3 months from the date of manufacture

REVIEW OF LITERATURE

சரக்கொன்றைப்பூ[IV]

சரக்கொன்றை

Classification:

Kingdom :	: Plantae
Clade :	: Angiosperns
Class	: Dicotyledons
Sub-class	: Polypetalae
Series	: Calyciflorae
Order	: Rosales
Family	: Caesalpiniaceae
Genus	: Cassia
Species	: C.fistula
Botanical name	: Cassia fistula. Linn

வேறுபெயர்:

கொன்றை

கொண்ணை

பெருங்கொன்றை

கிருதாமலம்

தாமம்

மதலை

இதழி

கடுக்கை

ஆக்குவதம்

பிறமொழிகள்:

English	: Indian ladurnam,
	: Pudding-pipe tree,
	: Purging cassia,
	: Purging fistula
Telugu	: Rela-kayulu
Malayalam	: Konna
Arab	: Khiyar-shanbar
Pers	: Khizar-chanbar
Hindi	: Amaltas
Kannada	: Kakke
Sanskrit	: Aragvadham

பயன்படும் உறுப்பு: பூ, இலை, புளி, விதை, மரப்பட்டை, வேர்ப்பட்டை

பூ:

சுவை	: துவர்ப்பு
தன்மை	: வெப்பம்
பிரிவு	: கார்ப்பு

செய்கை:

புழுக்கொல்லி	கிருமிநாசினி	Vermifuge

பொதுக்குணம்:

பூவுக்கு வெள்ளை, வெட்டை, பாண்டு, **காமாலை**, சொறி, கரப்பான், தேமல், குடல்வலி ஆகியவை நீங்கும்.

மேலும் வயிற்றுப்புழு, நீரிழிவு, குடலைப்பற்றிய நோய்கள் போம்.

மலக்கிருமி போகும் மதிநீர்க் குடலாந்
தலத்துநோ யுங்குலைந்து சாயும் - நிலத்திற்குள்
என்றைக்கும் வாடாத வின்ப மலர்க்கொம்பே
கொன்றைப் பசுமலரைக் கொள்.

வழக்கு:

பூவைத் தனித்தேனும், இதன் கொழுந்துடன் சேர்த்தேனும் அரைத்துப் பாலில் கலக்கியுண்டால் வெள்ளை, வெட்டை, **காமாலை**, பாண்டு குணமாகும்.

Cassia fistula Extract[V]

Active Ingredient :

Anthraquinones 1.5% & Fistulic Acid

Common Name :

Fistula, Laburnum, Purging Fistula, Golden Shower

Chemical Constituents and Components :

Main chemical components are anthraquinones, fistulic acid, rhein, rheinglucoside, sennosides A and B, phlobaphenes, emodin, chrysophanic acid, fistuacacidin, lupeol, beta-sitosterol and hexacosanol.

Actions:

Anthroquinone:

1. It decreases the amount of enzymatic cytochrome C reduction at low concentration of NADH.
2. It shows good Antineoplastic Activity.
3. It inhibits the Catalytic Activity of Topoisomerase II.
4. It shows clastogenic effect on bone marrow cell and used as weak genotoxic.

Fistulic acid:

1. It significantly lowers the serum levels of transamineses (SGOT and SGPT).
2. Bilirubin and alkaline phosphatase (ALP).
3. It significantly lowers the lipid level in blood and liver.
4. It significantly decreases the high activities of serum GOT, GPT, Alkaline and phosphatase.

Curing Diseases :

1. It is used to cure erysipelas, malaria, rheumatism, syphilis and ulcers.
2. It is used in the treatment of cardiovascular diseases and cancer.

Research Information :

Cassia fistula fruit pulp possesses antifungal property. Secondary metabolites present in the extract responsible for the inhibition of fungus and its growth.

Possible Combinations : Cassia fistula + Cassia angustigolia (gall stone treatment)

Cassia fistula (Amaltas)[VI]

Cassia fistula is known to be native to India. For ornamental and commercial purpose it is extensively cultivated in Tropical region of America. Its Fruit pulp can be used as mild laxative, in arthritis, as well as cardiac and stomach problems. The roots of *Cassia fistula* are useful in skin diseases, tuberculous glands, syphilis and burning sensation. The bark is useful in boils, pustules, leprosy, ringworm, dysentery, leprosy, jaundice, dyspepsia, fever and diabetes. The fruit tissue has anti-inflammatory, diuretic and antipyretic activity. The leaves are useful in skin eruptions, eczema, ringworm and pruritus. It is used in the treatment of varicose veins. It helps in shrinking engorged veins and has a powerful anti-inflammatory effect.

Major Chemical Constituents:

The seeds are rich in glyserides and fatty acids. The bark contains lupeol, beta-sitosterol and Hexacosanol. The fruit tissue contains substantial amount of minerals.

Pharmacological Actions:

Laxative property:

The study was conducted to see the laxative effect of *Cassia fistula*. The results of the study concluded that *Cassia fistula* could be safely utilized as laxative drugs.

Antioxidant and Anti-inflammatory activity:

Cassia fistula possesses significant Antioxidant and Anti-inflammatory activity in acute and chronic model of rat liver and kidney homogenates. Aqueous and alcoholic extract has anti-inflammatory effect in both air pouch granuloma and cotton pellet granuloma in male albino rat.

Wound Healing:

Cassia fistula treated rats showed, better wound closure, improved tissue regeneration at the wound site, and supporting histo-pathological parameters pertaining to wound healing.

Antimicrobial:

The crude extract of *Cassia fistula* shows antimicrobial activity against various species of microorganisms. Ether extract of fruit pulp was found to have antibacterial action against both gram positive and gram-negative bacteria.

Herb Drug interactions:

Cassia fistula is found to have synergistic effect when it is used along with other laxative agents

Safety:

LD_{50} of *Cassia fistula* is 6600mg/kg without any pathological effects on the organs examined microscopically.

PHYSICAL PROPERTIES

Materials and Methods:

The Physical properties of Sarakonraipoo Chooranam were analysed in the following procedure.

pH at 10% of aqueous solution:

5gm of Sarakonraipoo Chooranam was weighed accurately and placed in clear 100 ml beaker. Then 50 ml of distilled water was added to it and dissolved well. After 30 minutes it was then applied in to pH mater at standard buffer solution of 4.0, 7.0, 9.2.

Ash Values:

The Ash values are a measure of the inorganic constituents present in the raw drug. A high ash content explains its unsuitable nature to be used as a drug

Total Ash:

A little of extract was taken in a silica crucible previously ignited, cooled and weighed. It was incinerated by gradually increasing the heat not exceeding dull red heat (450^0C) until free from carbon, cooled and weighed. The percentage of ash was calculated with reference to air- dried drug. The procedure was repeated to get the constant weight.

Water soluble ash:

The total ash was boiled with 25 ml water and filtered through ash less filter paper (Whatmann 4.1). It was followed by washing with hot water .The filter paper was dried and ignited in the silica crucible, cooled and the water insoluble ash was weighed. The water-soluble ash can be calculated by subtracting the water insoluble ash from the total ash.

Acid insoluble ash:

The total ash obtained was boiled for 5 minutes with 25 ml of (10% w/v) dilute hydrochloric acid and filtering through ash less filter paper (Whatmann 4.1). The filter paper was ignited in the silica crucible, cooled and insoluble ash was weighed.

BIO -CHEMICAL ANALYSIS

The biochemical analysis of "Sarakonraipoo Chooranam" was carried out in the Biochemistry lab, NIS

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S.No	EXPERIMENT	OBSERVATION	INFERENCE
1.	Appearance of sample	Brownish yellow in colour	
2.	**Solubility:** a. A little(500mg) of the sample was shaken well with distilled water. b. A little(500mg) of the sample was shaken well with con. HCl/Con. H_2So_4	Sparingly soluble	Absence of Silicate
3.	**Action of Heat:** A small amount(500mg) of the sample was taken in a dry test tube and heated gartly at first and then strong.	No white fumes evolved	Absence of Carbonate
4.	**Flame Test:** A small amount(500mg) of the sample was made into a paste with con. HCl in a watch glass and introduced into non-luminous part of the Bunsen flame.	No Bluish green flame appeared.	Absence of Copper
5.	**Ash Test:** A filter paper was soaked into a mixture of sample and dil. cobalt nitrate solution and introduced into the Bunsen flame and ignited.	Yellow colour flame appeared.	Presence of sodium

Preparation of Extract:

5gm of Sarakonraipoo Chooranam was weighed accurately and placed in a 250ml clean beaker and added with 50ml of distilled water. Then it was boiled well for about 10 minutes. Then it was cooled and filtered in a 100ml volumetric flask and made up to 100ml with distilled water.

S.No	EXPERIMENT	OBSERVATION	INFERENCE
	I.Test For Acid Radicals		
1.	**Test For Sulphate:** a. 2ml of the above prepared extract was taken in a test tube to this added 2ml of 4% dil ammonium oxalate solution b. 2ml of the above prepared extracts was added with 2ml of dil-HCl was added until the effervescence ceases off. Then 2ml of dil.Barium chloride solution was added.	No Cloudy appearance present	Absence of Sulphate
2.	**Test For Chloride:** 2ml of the above prepared extract was added with dil. HCl till the effervescence ceases. Then 2ml of dil.silver nitrate solution was added.	No cloudy appearance.	Absence of Chloride
3.	**Test For Phosphate:** 2ml of the extract was treated with 2ml of dil.ammonium molybdate solution and 2ml of con.HNo3.	Yellow appearance present	Presence of Phosphate
4.	**Test For Carbonate:** 2ml of the extract was treated with 2ml dil. Magnesium sulphate solution	No Cloudy appearance.	Absence of carbonate
5.	**Test For Nitrate:** 1gm of the substance was heated with copper turning and concentrated H2So4 and viewed the test tube vertically down.	No Brown gas evolved.	Absence of Nitrate

6.	**Test For Sulphide:** 1gm of the substance was treated with 2ml of con. HCL	No Rotten Egg Smelling gas.	Absence of Sulphide
7.	**Test For Fluoride & Oxalate:** 2ml of extract was added with 2ml of dil. Acetic acid and 2ml dil.calcium chloride solution and heated.	No Cloudy appearance	Absence of fluoride and oxalate
8.	**Test For Nitrite:** 3drops of the extract was placed on a filter paper, on that-2 drops of dil.acetic acid and 2 drops of dil.Benzidine solution was placed.	No Characteristic changes	Absence of Nitrite
9.	**Test For Borate:** 2 Pinches(50mg) of the substance was made into paste by using dil.sulphuric acid and alcohol (95%) and introduced into the blue flame.	No Bluish green colour flame.	Absence of borate
	II. Test For Basic Radicals		
1.	**Test For Lead:** 2ml of the extract was added with 2ml of dil.potassium iodine solution.	No yellow Precipitate obtained.	Absence of Lead
2.	**Test For Copper:** One pinch(50mg) of substance was made into paste with con. HClin a watch glass and introduced into the non-luminuous part of the flame.	No Blue colour flame No Blue colour precipitate formed.	Absence of copper
3.	**Test For Aluminium:** To the 2ml of extract, dil.sodium hydroxide was added in 5 drops to excess.	NoYellow colour appeared.	Absence of aluminium

4.	**Test For Iron:** a.To the 2ml of extract,2ml of dil.ammonium solution was added. b.To the 2ml of extract 2ml thiocyanate solution and 2ml of con HNo3 was added	Bloodred colour not appeared. Bloodred colour appeared.	a.Absence of iron b.Presence of Iron
5.	**Test For Zinc:** To 2ml of the extract, dil.sodium hydroxide solution was added in 5 drops to excess and dil.ammonium chloride was added.	No White precipitate was formed	Absence of Zinc
6.	**Test For Calcium:** 2ml of the extract was added with 2ml of 4% dil.ammonium oxalate solution	No Cloudy appearance and white precipitate was obtained	Absence of calcium
7.	**Test For Magnesium:** To 2ml of extract dil.sodium hydroxide solution was added in drops to excess.	White precipitate was Not obtained	Absence of Magnesium
8.	**Test For Ammonium:** To 2ml of extract 1 ml of Nessler's reagent and excess of dil.sodium hydroxide solution are added.	No Brown colour appeared	Absence of ammonium
9.	**Test For Potassium:** A pinch(25mg) of substance was treated of with 2ml of dil.sodium nitrite solution and then treated with 2ml of dil.cobalt nitrate in 30% dil.glacial acetic acid.	No Yellowish precipitate was obtained.	Absence of Potassium
10.	**Test For Sodium**: 2 pinches(50mg) of the substance was made into paste by using HCl and introduced into the blue flame of Bunsen burner.	Yellow colour flame appeared	Presence of sodium
11.	**Test For Mercury**: 2ml of the extract was treated with 2ml of dil.sodium hydroxide solution.	No yellow precipitate was obtained	Absence of mercury
12.	**Test For Arsenic:** 2ml of the extract was treated with 2ml of dil.sodium hydroxide solution.	No brownwish red precipitate was obtained	Absence of arsenic

III. Miscellaneous			
1.	**Test For Starch:** 2ml of extract was treated with weak dil.iodine solution	No blue colour developed	Absence of starch
2.	**Test For Reducing Sugar:** 5ml of Benedict's qualitative solution was taken in a test tube and allowed to boil for 2 minutes and added 8 to 10 drops of the extract and again boil it for 2 minutes. The colour changes are noted.	Brick red colour not developed	Absence of reducing sugar
3.	**Test For The Alkaloids:** a) 2ml of the extract was treated with 2ml of dil.potassium iodide solution. b) 2ml of the extract was treated with 2ml of dil.picric acid. c) 2ml of the extract was treated with 2ml of dil.phosphotungstic acid.	Yellow colour developed	Presence of Alkaloid
4.	**Test For Tannic Acid:** 2ml of extract was treated with 2ml of dil.ferric chloride solution	No black precipitate was obtained	Absence of Tannic acid
5.	**Test For Unsaturated Compound:** To the 2ml of extract 2ml of dil.Potassium permanganate solution was added.	Potassium permanganate was not decolourised	Absence of unsaturated compound
6.	**Test For Amino Acid:** 2 drops of the extract was placed on a filter paper and dried well. 20ml of Biurette reagent was added.	Violet colour developed	Presence of amino acids

7.	**Test For Type Of Compound:** 2ml of the extract was treated with 2 ml of dil.ferric chloride solution.	No green colour developed No red colour developed No violet colour developed No blue colour developed	Absence of oxy quinole pinephrine and pyro catechol Anti pyrine, Aliphatic amino acids and meconic acid are absent Apomorphine salicylate and Resorcinol are absent Morphine, Phenol cresol and hydro uinone are absent

THIN LAYER CHROMATOGRAPHY

PRINCIPLE:

Similar to other chromatographic methods TLC is also based on the principle of separation. The separation depends on the relative affinity of compounds towards stationary and mobile phase. The compounds under the influence of mobile phase (driven by capillary action) travel over the surface of stationary phase. During this movement the compounds with higher affinity to stationary phase travel slowly while the others travel faster. Thus separation of components in the mixture is achieved.

Once separation occurs individual components are visualized as spots at respective level of travel on the plate. Their nature or character are identified by means of suitable detection techniques.

PROCEDURE:

The stationary phase is applied onto the plate uniformly and then allowed to dry and stabilize. But now a days ready made plates are preferred.

A thin mark is made at the bottom of the plate with a pencil to apply the sample spots. Then samples solutions are applied on the spots marked on the line at equal distances.The mobile phase is poured into the TLC chamber to a level few centimeters above the chamber bottom. A filter paper moistened in mobile phase is placed on the inner wall of the chamber to maintain equal humidity in the entire chamber and there by avoid edge effect.

Then the plate prepared with sample spotting is placed in TLC chamber such that the side of the plate with sample line is towards the mobile phase. Then the chamber is closed with a lid.

The plate is immersed such that sample spots are well above the level of mobile phase but not immersed in the solvent as shown in the picture for development.

Allow sufficient time for development of spots. Then the plates are removed and allowed to dry. The sample spots are visualized in suitable UV light chamber or any other methods as recommended for the said sample.

ADVANTAGES OF TLC:

The *Thin layer chromatography* advantages include:

- It is simple process with short development time.
- It helps in visualization of separated compound spots easily.
- The method helps to identify the individual compounds.
- It helps in isolation of most of the compounds.
- The separation process is faster and the selectivity for compounds is higher (even small differences in chemistry is enough for clear separation.
- The purity standards of the given sample can be assessed easily.
- It is a cheaper chromatographic technique.

Applications of Thin layer chromatography

- To check purity of given samples.
- Identification of compounds like acids, alcohols, proteins, alkaloids, amines, antibiotics etc.
- To evaluate reaction process by assessment of intermediates, reaction course etc.
- To purify samples i.e for purification process.
- To keep a check on the performance of other separation processes.
- Being a semi quantitative technique, TLC chromatography is used for rapid qualitative measurements than for quantitative purposes. But due its rapidity of results, easy handling and inexpensive procedure, it finds its application as one of the most widely used chromatography techniques.

TOXICOLOGICAL STUDY

ACUTE AND SUB-ACUTE TOXICITY STUDY ON SARAKONRAIPOO CHOORANAM IN RODENTS

Animals:

Mice of either sex weighing 25-30gm and rats weighing 210-240gm were obtained from the animal house of Vels University. The animals were used with the approval of the Institute Animal Ethics Committee and obtained from Vels University, Chennai. They were fed with a balanced standard pellet diet and maintained under standard laboratory conditions, providing 24-28^{0}C temperature, standard light cycle (12 hr light, 12 hr dark) and water ad libitum. Animals were kept in cages with raised floors of wide mesh to prevent coprophagy. Animal welfare guidelines were observed during the maintenance period and experimentation. The rats were randomly assigned to control and different treatment groups, six animals per group. The animals were acclimatized for one week under laboratory conditions.

ACUTE TOXICITY STUDY-OECD 425 GUIDELINES

Acute oral toxicity test for the Sarakonraipoo Chooranam was carried out as per OECD Guidelines 425. As with other sequential test designs, care was taken to ensure that animals are available in the appropriate size and age range for the entire study. The test substance is administered in a single dose by gavage using a stomach tube or a suitable intubation cannula. The fasted body weight of each animal is determined and the dose is calculated according to the body weight. After the substance has been administered, food was withheld for a further 2 hours in mice. The animals were observed continuously for the first 4 hr and then each hour for the next 24 hr and at 6 hourly intervals for the following 48 hr after administering of the test drug, to observe any death or changes in general behaviour and other physiological activities. Single animals are dosed in sequence usually at 48 hr intervals. However, the time interval between dosing is determined by the onset, duration, and severity of toxic signs. Treatment of an animal at the next dose was delayed until one is confident of survival of the previously dosed animal.

Observation of toxicity signs:

General behavior, respiratory pattern, cardiovascular signs, motor activities, reflexes, change in skin and fur, mortality and the body weight changes were monitored daily. The time of onset, intensity, and duration of these signs, if any, was recorded.

Acute toxicity study:

Acute toxicity study was performed for Sarakonraipoo Chooranam according to the acute toxic up and down method as per OECD guidelines 425, albino mice were used for acute toxicity study. The animals were kept fasting for overnight providing only water, after which the Sarakonraipoo Chooranam was administered orally at the dose of 1000, 2000 and 5000 mg/kg and observed for 14 days.

Sub-Acute Toxicity

In a 28-days sub-acute toxicity study, twenty four either sex rats were divided into four groups of 6 rats each. Group I that served as normal control was administered with distilled water (p.o.) while Groups II, III and IV were administered daily with the Sarakonraipoo Chooranam (p.o.) for 28 days at a dose of 100, 250 and 500mg/kg respectively. The animals were then observed daily for gross behavioural changes and any other signs of subacute toxicity. The weight of each rat was recorded on day 0 and weekly throughout the course of the study, food and water consumption per rat was calculated. At the end of the 28 days they were fasted overnight, each animal was anaesthetized with diethylether, following which they were then dissected and blood samples were obtained by cardiac puncture into heparinised tubes. The blood sample collected from each rat was centrifuged with 3000 X g at $4^{o}C$ for 10 min to separate the serum and used for the biochemical assays.

Hematological and blood biochemical analyses:

At the end of the study, all animals were kept fasted for 16-18 h and then anesthetized with anesthetic ether on the 28th day. Blood samples for hematological and blood chemical analyses were taken from retro orbital vein. Heparinized blood samples were taken for determining complete blood count (white blood cell count, differential white blood cell count, platelet count, red blood cell count, hematocrit, and hemoglobin) by semiautomated hematology analyzer. The serum from non-heparinized blood was

carefully collected for blood chemistry and enzyme analysis glucose, creatinine, total protein, albumin, total and direct bilirubins, serum glutamate-oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT) and alkaline phosphatase (ALP) were automatically determined using autoanalyzer.

Necropsy:

All rats were sacrificed after the blood collection. The positions, shapes, sizes and colors of internal organs were evaluated. The Spleen, Testes, Pancreas, Lung, Liver, Brain, Heart, Stomach, Intestine, Bone, Ovary, and Kidney tissues were excised from all rats to visually detect gross lesions, and weighed to determine relative organs weights and preserved in 10% neutral formalin for histopathological assessment. The tissues were embedded in paraffin, and then sectioned, stained with haematoxylin and eosin and were examined microscopically.

Statistical analysis:

Values were represented as mean ± SEM. Data were analysed using one-way analysis of variance (ANOVA) and group means were compared using the Tukey-Kramer Multiple Comparisms Test using GraphPad Instat-V3 software. P values < 0.05 were considered significant.

RESULTS AND DISCUSSION

The acute toxicity study of the Sarakonraipoo Chooranam indicated no changes in the behavior and in the sensory nervous system responses in the animals. Also no adverse gastrointestinal effects were observed in the male and female mice used in the experiment. All the mice that received upto 5.0g/kg dose of the Sarakonraipoo Chooranam survived beyond the 24 hours of observation. Hence the dose was fixed as 100, 250 and 500mg/kg for further sub-acute toxicity study. During the sub-acute toxicity tests, the results obtained on the average daily water, food intake and weekly weight gain. The eating and drinking habit and behavior of all the animals used were normal in both vehicle-treated and Sarakonraipoo Chooranam treated animals. The results revealed that essential organs such as the liver, kidney, spleen and testes were not adversely affected during the sub-acute administration.

Macroscopically, the liver, spleen, lung, testis and the kidney showed no discolouration and the textures were consistent when compared with the control groups. Histopathological examination revealed that the spleens, livers, lung, testes and the kidneys of rats administered with Sarakonraipoo Chooranam showed no differences relative to those of the control group at the two dose levels, though there was mild focal proximal tubular epithelial necrosis in the kidney at 500mg/kg.

Hence, the results indicate that Sarakonraipoo Chooranam at 500 mg/kg body weight is not toxic to the liver, spleen and testes of rat. There was no any significant changes in serum levels of cholesterol, triglycerides and protein concentration following a 28 days treatment of the Sarakonraipoo Chooranam, it may indicate therefore, that it is not toxic to the animal. In conclusion, the present results show that Sarakonraipoo Chooranam non-toxic in rat model.

PHARMACOLOGICAL STUDY[VII]

HEPATOPROTECTIVE ACTIVITY OF SARAKONRAIPOO CHOORANAM AGAINST CCl_4 INDUCED HEPATOTOXIC RATS

MATERIALS AND METHODS:

Drugs and chemicals:

Silymarin was a gift sample from Micro Laboratories, Hosur, India. Aspartate amino transferase and Alanine amino transferase, alkaline phosphatase and total proteins kits were from RANDOX Laboratories Ltd. All other chemicals and reagents used were of analytical grade.

Animals:

Male Wistar albino rats and albino mice were used for the study. The animals were housed in groups of six and maintained under standard conditions (27 ± 2°C, relative humidity 44-56% and light and dark cycles of 10 and 14 hrs respectively), fed with standard rat diet and purified drinking water ad libidum one week before and during the experiment. All the experiments and protocols described in the present study were approved by the Institutional animal ethical committee
(No: XIII/VELS/PCOL/42/2000/CPCSEA/08.08.2012).

Treatment protocol:

Group I : Normal control (normal saline)
Group II: Hepatotoxic control (CCI_4 10% *v/v* in olive oil) at a dose of 1ml/kg, p.o.)
Group III: Treatment group (CCI_4+Sarakonraipoo Chooranam 250mg/kg for 16 days)
Group IV: Treatment group (CCI_4+Sarakonraipoo Chooranam 500mg/kg for 16 days)
Group V: Standard group (CCI_4+Silymarin for 16 days)

Biochemical estimation:

At the end of the drug treatment period, all the animals were anaesthetized by application of light ether and blood samples were collected from a group of animals from retro orbital plexus. Plasma and serum samples were separated kept at –20˚C for biochemical analysis. The animals were sacrificed by deep anesthesia, the perfused liver

of each animal was dissected out and washed with isotonic solution, and their wet weight was recorded. The liver homogenate was prepared using phosphate buffer solution for biochemical analysis. The activities of serum aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase and total proteins were analyzed using commercial kits, to assess the acute hepatic damage caused by CCl_4.

Histopathological studies:

After treatment, liver of all animals from each respective groups were dissected out and a portion of liver tissue section of nearly 5 µm thickness were fixed in Bouin's fixative, dehydrated by varying percentage of ethanol and stained with haemotoxylin and eosin. Microscopic evaluation of the thin section was undertaken and variations in histoarchitecture were photographed at a magnification of 10x.

Statistical analysis:

The values were expressed as mean ± SEM. The statistical analysis was carried out by one way analysis of variance (ANOVA) followed by Dunnet's 't' - test. P values <0.05 were considered significant.

RESULTS AND DISCUSSION:

The present studies were performed to assess the hepatoprotective activity in rats against carbon tetrachloride as hepatotoxin to prove its claims in traditional practice against liver disorders. A number of reports indicates that overdose of carbon tetrachloride can produce centrizonal hemorrhagic hepatic necrosis in humans and experimental animals. Carbon tetrachloride -induced hepatic injury is commonly used as an experimental method for the study of hepatoprotective effects of medicinal plants extracts and drugs. The extent of hepatic damage is assessed by histological evaluation and the level of various biochemical parameters in circulation. CCl_4 undergoes hepatic metabolism to give rise to trichloro methyl radicals, which upon reacting with reactive oxygen species yields trichloromethyl peroxide radicals, which forms covalent bond with membrane lipids and destroy the membrane integrity It produces hepatotoxicity by altering liver microsomal membranes in experimental animals.

The acute toxicity study revealed the absence of lethality among the tested animals when the Sarakonraipoo Chooranam was administered as a single dose (1000, 2000 and 5000mg/kg). There were no signs of any gross behavioral changes except

tremor indicating the safe use of the Sarakonraipoo Chooranam. The liver is known to play a significant role in the serum protein synthesis, being the source of plasma albumin and fibrinogen and also the other important components like α and β-globulin. Necrosis or membrane damage releases the enzymes into circulation and hence it can be measured in the serum.

The reversal of increased serum enzymes in CCl_4 induced liver damage by the Sarakonraipoo Chooranam may be due to the prevention of the leakage of intracellular enzymes by its membrane stabilizing activity. Amino transferases contribute a group of enzymes that catalyze the interconversion of amino acids and α-keto acids by the transfer of amino groups. These are liver specific enzymes and are considered to be very sensitive and reliable indices for necessary hepatotoxic as well as Hepatoprotective or curative effect. Both AST and ALT levels increase due to toxic compounds affecting the integrity of the liver cells. It was evident that Sarakonraipoo Chooranam was able to reduce all the elevated biochemical parameters due to the hepatotoxin intoxication.

The levels of total proteins and albumin were reduced due to the carbon tetrachloride induced hepatotoxicity. Reduction in the levels of ALP, SGOT and SGPT towards the normal value is an indication of regeneration process. The protein and albumin levels were also raised suggesting the stabilization of endoplasmic reticulum leading to protein synthesis. The protective effect exhibited by Sarakonraipoo Chooranam at dose level of 250 and 500mg/kg was comparable with the standard drug Silymarin.

Hepatocytes of the normal group showed a normal lobular architecture of the liver. A comparison of the liver section of animals treated with CCl_4 showed the normal liver architecture was disturbed by hepatotoxin intoxication characterized by cell vacuolation, pyknotic and degenerated nuclei and wall of bile capillaries. Sarakonraipoo Chooranam (250and 500 mg/kg b.w.) + CCl_4, the nucleii are not very clear as in normal hepatocytes; however, when compared to the CCl_4 damaged group, the number of hepatocytes with normal nucleus was much more. The endothelium is disrupted in places. Pyknotic nucleus and vacuolation in cytoplasm are observed to be low, as compared to the CCl_4 group. Silymarin treated group showed normal hepatocytes and their lobular architecture was normal.

CONCLUSION:

The Sarakonraipoo Chooranam has shown the ability to maintain the normal functional status of the liver. From the above study, it can be concluded that the Sarakonraipoo Chooranam is proved to be one of the useful Siddha remedy for liver disorder.

DISEASE ASPECT
SIDDHA ASPECT

கல்லீரல் நோய்:[VIII]

வேறுபெயர்:

- வலப்பாட்டீரல் நோய்
- மாந்தக்கட்டி
- கல்மாந்தம்
- யக்குதம்

இயல்பு:

வலப்பக்கம் உள்ள வலப்பாட்டீரல், அப்பக்கமுள்ள கடை விலா எலும்பு வரையிலும் நிற்காமல் தன்னளவில் பெருத்துக் கொண்டே வருவதும்,தன் இயற்கை தொழிலை இழப்பதும், அல்லது அளவில் சிறுத்துக் கொண்டே வருவதுமான இயல்பை உடைய நோய்.

நோய் வரும் வழி:

- உடற்கொவ்வா உணவுகளை உண்ணல்
- கள், சாராயம் முதலிய மயக்கத்தை தரும் குடிவகைகளை குடித்தல்
- பெண்களின் கூட்டால் வரும் நோய்
- சுர நோய்க்கு துணையாக வரும்

நோய் எண்:

குற்ற அளவாக மூன்று வகைப்படும்

- வளி கல்லீரல்நோய்
- அழல் கல்லீரல்நோய்
- ஐய கல்லீரல்நோய்

குறிகுணங்கள்:

- மிகு சுரம்
- வாந்தி
- தலைநோய்
- அடிக்கடி கழிதல்
- சிறுநீர் சிவந்து இழிதல்
- கல்லீரல் தன்னளவில் பெருத்து கட்டி முட்டியாக காணல்
- இதைத் தொடர்ந்து மஞ்சள் **காமாலை** உண்டாதல்
- உடல் வெளுப்பு,வீக்கம் நோய்களும்
- துணைநோயாக பெருவயிறும் வரும்

காமாலை

இது கல்லீரல் பாதிப்பினால் வரும் நோய்.

இயல்பு:

சிறுநீர், கண், நா, உடல் யாவும் மஞ்சள் நிறத்தைப் பெறும் நோயாம்.

நோய் வரும் வழி :

தீக்குற்றத்தைப் பெருக்கக்கூடிய செயலையும் அளவிற்கு விஞ்சிய உண்வையும் கொள்ளின், கேடடைந்த அக்குற்றத்தின் அளவாகக் குருதி கெட்டு, பித்த நீரை குருதியிலும், உடல் உறுப்புகளாகிய சதை, தோல், கண், நாக்கு இவற்றில் தங்கச்செய்து நோயை பிறப்பிக்கும்.

முற்குறி:

"பருகவே உள்ளங்கா லுள்ளங் கைகள்
பகர்முகங்கண் ணுடம்புமிக வெளுப்பு காணும்
கருகவே கால்கைக ளோய்சலாகுங்
கனமாக நடுக்கியே இளைப்புண்டாகுஞ்
சுருகவே மலந்தானும் வறண்டு கட்டும்
தூயமுக மஞ்சளிட நிறம தாகும்
வெருகவே வீக்கமாஇக் களைப்புண்டாகும்
மிகக்காது மந்தந்தலை கனப்புண் டாகும்"

-யூகி முனிவர்

பொருள்:

இந்நோயில் வாயில் நீர் ஊறல், வாய்குமட்டல், நா கைத்தல், உணவில் வெறுப்பு, உண்ணிணும் செரியாமை, உடல் வறட்சி, தோல் சுருங்கி தவளைத் தோலை ஒத்தல் என்னும் குறிகளைக் காட்டி கண், நகக்கண், முகம், உடலின் தோல் முதலியவைகளும், சிறுநீரும் மஞ்சளிக்கும். அன்றியும் இதில் உள்ளங்கால், கை, முகம், கண், உடம்பு இவை வெளுத்தல், கையும் காலும் சோர்தல், உடல் நடுக்கல், அடிக்கடி இளைப்பு தோன்றல், எரு கட்டுப்பட்டு தீய்ந்து வெளியாதல் மிகுதூக்கம், தலை கனத்தல் முதலிய குறிகளைக் காட்டி உடல் முதலியன மஞ்சளிக்கும் நோயாம்.

நோய் எண்:

01. வளி காமாலை
02. அழல் காமாலை
03. ஐயம் காமாலை
04. வளி ஐயம் காமாலை
05. அழலையம் காமாலை
06. முக்குற்றம் காமாலை
07. மஞ்சள் காமாலை
08. அழகு காமாலை
09. செங்கமல காமாலை
10. கும்ப காமாலை
11. குன்ம காமாலை
12. ஊது காமாலை
13. வறள் காமாலை

MODERN ASPECT[IX]

Jaundice, also known as **Icterus**, is a term used to describe a yellowish tinge to the skin and sclerae (the white part of the eye) that is caused by hyperbilirubinemia (an excess of bilirubin in the blood). Body fluids may also be yellow. The color of the skin and sclerae varies depending on levels of bilirubin, mildly elevated levels display yellow skin and sclerae, while highly elevated levels display brown

Bilirubin (bil-ih-ROO-bin) is a yellow colored substance that is responsible for the yellowing of the skin and sclerae. Bilirubin is a waste product that remains in the bloodstream after the iron is removed from the hemoglobin, which is released from the degradation of erythrocytes (cells that contain hemoglobin and can carry oxygen to the body). When there is an excess of bilirubin it may leak out into surrounding tissues, saturating them with this yellow substance.

Bilirubin that is circulating freely in the blood is called unconjugated bilirubin. One of the liver's functions is to filter out waste, such as bilirubin, from the blood. Once it is in the liver, other chemicals latch on to the bilirubin, creating a substance called conjugated bilirubin, which is secreted in bile (a digestive juice released by the liver) and then excreted. Bilirubin is what gives feces its brown color.

The modern English word jaundice is derived from the middle French word jaunisse. *Jaun* means "yellow" and *isse means* "ness"; hence the middle French word *jaunisse*, which means "yellowness".

According to Medilexicon's medical dictionary, jaundice is:
"*A yellowish staining of the integument, sclerae, deeper tissues and excretions with bile pigments, resulting from increased levels in the plasma*".

There are 3 main types of jaundice:

- Hepatocellular jaundice
- Hemolytic jaundice
- Obstructive jaundice

Hepatocellular jaundice:

A type of jaundice that occurs as a result of liver disease or injury**.**

Hemolytic jaundice:

A type of jaundice that occurs as a result of hemolysis (an accelerated breakdown of erythrocytes - red blood cells) leading to an increase in production of bilirubin.

Obstructive jaundice:

A type of jaundice that occurs as a result of an obstruction in the bile duct (a system of tubes that carries bile from the liver to the gallbladder and small intestine), which prevents bilirubin from leaving the liver.

Jaundice, not to be confused with infant jaundice, is usually a sign of an underlying disorder.

Causes:

Jaundice most often occurs as a result of an underlying disorder that either causes tissues to become over-saturated with bilirubin or prevents the liver from disposing of bilirubin. Some underlying conditions that may cause jaundice are:

- **Acute inflammation of the liver**:

  May impair the ability of the liver to conjugate and secrete bilirubin, resulting in a buildup of bilirubin.
- **Inflammation of the bile duct**:

  May prevent the secretion of bile and removal of bilirubin, causing jaundice.
- **Obstruction of the bile duct**:

  Prevents the liver from disposing of bilirubin, which results in hyperbilirubinemia.
- **Hemolytic anemia**:

  Production of bilirubin increases when large quantities of erythrocytes are broken down.

- **Gilbert's syndrome**:

  An inherited condition that impairs the ability of enzymes (biomolecules that provoke chemical reactions between substances) to process the excretion of bile.

- **Cholestasis**:

  A condition in which the flow of bile from the liver is interrupted. The bile containing conjugated bilirubin remains in the liver instead of being excreted.

More rare conditions that may cause jaundice include:

- **Crigler-Najjar syndrome**:

  An inherited condition that impairs the specific enzyme responsible for processing bilirubin, resulting in an excess of bilirubin.

- **Dubin-Johnson syndrome**:

  An inherited form of chronic jaundice that prevents conjugated bilirubin from being secreted out of the liver's cells.

- **Pseudojaundice**:

  A harmless form of jaundice in which the yellowing of the skin results from an excess of β-carotene not from an excess of bilirubin; usually from eating lots of carrots, pumpkin, or melon.

Signs and symptoms:

The most pervasive sign of jaundice is a yellow tinge to the skin and sclerae (whites of the eyes). This usually starts at the head and spreads down the body.

Other symptoms of jaundice include:

- Pruritis (itchiness)
- Fatigue
- Abdominal pain - typically indicates a blockage of the bile duct.
- Weight loss
- Vomiting
- Fever
- Paler than usual stools
- Dark urine

Complications:

The symptom pruritis (itching) can sometimes be so intense that patients scratch their skin raw, have insomnia or even commit suicide.

Most complications that arise are a result of the underlying cause of jaundice, not from jaundice itself. For example, jaundice caused by a bile duct obstruction may lead to uncontrolled bleeding due to a deficiency of vitamins needed for normal blood clotting.

Prevention:

Jaundice is related to the function of the liver, so it is essential that you maintain this vital organ's health by eating a balanced diet, exercising at least 30 minutes five times a week, and refraining from exceeding recommended amounts of alcohol.

CLINICAL STUDY

The pilot study on patients with Kamalai (Liver disease), and satisfying the inclusion criteria was conducted at the OPD, Ayothidoss Pandithar Hospital, National Institute of Siddha, Chennai-47.

Sample size:

20 patients.

SUBJECT SELECTION:

Inclusion Criteria:

- Age : 30-60 years
- Sex : Both male and female
- Weight : 35-80 kg
- Patient having symptoms of,

  Malaise

  Anorexia

  Nausea

  Vomiting

  Jaundice

  Upper abdominal pain

(Any of the 4 or 5 clinical symptoms)

Patient who are willing to provide blood sample for lab investigation.

Patient who are willing to attend OPD once in 7 days.

Patient willing to sign the informed consent stating that he/she will conscientiously stick to the treatment during 30 days but can opt out of the trial of his/her own conscious discretion.

Exclusion Criteria:

- A known case of any obstructive liver disease
- Cardiac disease
- Hepatic failure
- Pregnancy and lactation
- Any other serious illness

Withdrawal Criteria:

- Development of any adverse reaction
- Occurrence of any other serious illness
- Non co-operation of the patient

Trial Drug And Duration

Drug:

Sarakonraipoo Chooranam-1gm, bid with milk.

Duration of the study:

30days

Conduct of the study:

Kamalai (Liver disease) patients satisfying inclusion and exclusion criteria were attend to the trial. Informed consent was obtained from the patients. Routine investigations like Blood test, urine test, and PEFR were carried out before and after the trial treatment. For out patients the trial drug was issued for 7 days course. They were advised to visit the OPD once in 7 days. At each visit they were clinically assessed.

Clinical observation:

For the clinical study of "Sarakonraipoo Chooranam" on Kamalai (Liver disease), 20 patients were selected.

Among 20 patients, 16 (80 %) Pt's were in Male, 4 (20%) Pt's were in Female.

According to age wise distribution 50% were in 30-40 years, 35% were in 41-50 years and 15% were in 51-60 years.

DISCUSSION

The principle aim of this study was to assess the pre-clinical safety and efficacy and to evaluate the therapeutic efficacy of the drug *Sarakonraipoo chooranam* in the management of Kamalai (Liver disease).

As per Siddha text in Kamalai, pitha humors were deranged and also with kabam humors.

Pitha thathu has the basic function of production and maintenance of the blood environment and also for appetite and proper digestion of foods. Hence Pitha thathu when deranged produces symptoms like nausea, vomiting.

The trial drug *Sarakonraipoo chooranam* possess thuvarppu suvai and kaarppu veeryam, hence it balances the deranged pitham and kaba kutram.

Hence administration of the trial drug *Sarakonraipoo chooranam* was effective in the management of Kamalai.

The trial drug was studied as per OECD guidelines.

The preliminary phytochemicals screening of the trial drug *Sarakonraipoo chooranam* was done by using GC-MS. The result shows the presence of Alkaloid, Flavanoid, Glycosides, Amino acids, and Triterpenoids.

Bio-chemical analysis of the trial drug was done and it shows the presence of sodium, phosphate, alkaloids, amino acids, iron.

Toxicity Study

The pre-clinical study result ensures the safety and efficacy of the drug.

The results indicate that Sarakonraipoo Chooranam at 500 mg/kg body weight is not toxic to the liver, spleen and testes of rat.

There was no any significant changes in serum levels of cholesterol, triglycerides and protein concentration following a 28 days treatment of the Sarakonraipoo Chooranam, it may indicate therefore, that it is not toxic to the animal.

In conclusion, the present results show that Sarakonraipoo Chooranam non-toxic in rat model.

Pharmacological Study

The Sarakonraipoo Chooranam has shown the ability to maintain the normal functional status of the liver. From the above study, it can be concluded that the Sarakonraipoo Chooranam is proved to be one of the useful Siddha remedy for liver disorder.

Clinical Observation:

Age:

Among the 20 patient 50% of them were in the age group of 30-40. It reveals that mostly young and middle age group peoples were affected.

Sex:

All patients included were both Male and Female.

Gunam and Diet:

All patients included in this study were having Thamo Gunam and they have non-vegetarian diet regularly.

Body constitution:

All patients were observed to have Thondha Udal type of body constitution.

Thinai

In this study 75% of the patients were from Mullai Thinai and remaining 25% of people were from Kurinji Thinai. People from Mullai Thinai have more chances to develop deranged Pitham humor.

Family history

Among 20 patients 35% of the patients show positive family history.

Occupational history

Occupational history of the patients showing that,

55% of patients were coolies

35% of patients were farmers and

10% of patients were others.

Socio-economic status

Among 20 patients , 55% of patients were poor and 35% of them were from lower middle class.

In low-income countries such as India the prevalence of alcohol and tobacco use is higher among the poor**,** which increases the risk of cardiovascular disease, cancer, liver disease and injuries.

Naadi

Among 20 patients 65% were having pithakaba naadi and 35% of them having kabapitha naadi. This shows that in Kamalai both pitham and kaba humors were deranged.

Clinical symptoms

Among 20 patients,

- 85% of patients relieved from malaise.
  It may be because of presence of amino acid in the trial drug.
- 75% of patients relieved from anorexia.
- 70% of patients relieved from nausea
- 85% of patients relieved from vomiting
- 80% of patients relieved from upper abdominal pain.

Investigations

Among 20 patients the serum enzyme markers

- Total bilirubin, Direct bilirubin and Indirect bilirubin level was significantly reduced in 75% of patients
- SGOT, SGPT and Serum Alkaline phosphatase level was significantly reduced in 75% of patients.

SUMMARY

- The drug Sarakonraipoo chooranam was selected to evaluate the Hepato-protective activity in the management of Kamalai (Liver disease).
- The qualitative and quantitative analyses were carried out at Biochemistry lab, NIS and IITM, Chennai respectively. The results ensure the Hepato-protective activity of the Sarakonraipoo chooranam was due to the presence of active phytoconstituents of the drug.
- The pre-clinical evaluation (acute & repeated oral toxicity study) of the drug was carried out as per OECD guidelines in Vels University, Chennai. The result shows safety of the trial drug for human administration.
- The Preclinical and Pharmacological study was carried out in in Vels University, Pallavaram, Chennai. The result shows that the drug has significant Hepato-protective effect.
- As per Siddha literature, Modern science reviews and Research articles the trial drug has potent Hepato-Protective effect.
- 20 Patients were recruited for clinical trial. The trial drug Sarakonraipoo Chooranam at the dose of 1gm, bid was given to the patient for 7 days and patients were asked to visit the OPD once in 7 days for 30 days. Clinical assessment and prognosis was noted at each visit.
- At the end of clinical trial the results showed that,

  85% of patients relieved from malaise, 75% of patients relieved from anorexia, 70% of patients relieved from nausea, 85% of patients relieved from vomiting and 80% of patients relieved from upper abdominal pain and no noticeable adverse effects were observed during trial period.

The blood investigation also shows significant results. There is marked reduction in serum enzyme markers, 75% of patients have reduction in Total Bilirubin, Direct bilirubin and Indirect bilirubin. 70% of patients have reduction in SGOT, SGPT and Serum Alkaline phosphatase. No adverse effects were reported during the treatment period.

CONCLUSION

- The literature and research journal review of the plant shows that it has got significant Hepato-protective activity.
- The safety studies (acute and repeated oral toxicity) studies conducted revealed that the trial drug Sarakonraipoo Chooranam is safe. There were no abnormalities found in blood investigation and histo-pathological examination. Hence it can be reasonably assumed that the drug is safe for human use.
- The pharmacological study conducted in animal model shows significant Hepato-protective activity.
- Clinical study revealed the therapeutic efficacy of the trial drug by showing, reduction in serum enzyme markers Serum Total bilirubin, Direct bilirubin, Indirect bilirubin, SGOT, SGPT and Serum Alkaline phosphatase levels significantly. There was improvement in other clinical symptoms before and after treatment.
- There were no adverse reactions complained during the clinical trial.
- Hence, the drug Sarakonraipoo Chooranam can be used in the management of Kamalai (Liver disease).

INTRODUCTION

Siddha system is considered to be one of the ancient system of medicine in the world. Siddha is a complete holistic medical system that has been practiced in India for two thousands of years above.

The siddha system of medicine has derived its name from the word "Siddhi", which means "Perfection" or "Eternal bliss". Siddhi refers to the eight supernatural powers that are attainable by man. Those who attained these supernatural or perfection or Siddhi were called "Siddhars". They realised that if the body could be made strong and perfect, they could get rid of death and diseases.

They have fully investigated and studied the cause and the effects of the diseases and all kinds of drugs, minerals and poisons. They imparted their knowledge for the upliftment of the suffering community.

Panchapootha theory has also been described by Siddhars. The panchapoothas are Akasam or veli (ether), Kaattru or vayu (air), Thee or agni (fire), Neer or appu (water), Nilam or piruthuvi (earth).

Every form of matter has to be considered as panchapoothas in its orgin Vali (வளி) Azhal (அழல்) Iyam (ஐயம்) are the three main Physiological regulators of the body and mind. They are called "Muththathukkal". They remain always in a state of equipoise in healthy individuals. Increase or decrease of one or more will cause disease.

மருந்தென வேண்டாவாம் யாக்கைக் கருந்திய
தற்றது போற்றி யுண்ணின்.[X]

Generally when a medicine is administrated Siddha Physician prescribes diet regimen according to the nature of the medicine and severity of the disease. This is because over intake or consuming unbalanced and incompatible diet is considered to be the prime causative factor for upsetting the tridhosa balance leading to manifestations of various ailments.

Madhumegam is also called as "Neerizhivu" characterised by increased and frequent passing of urine, which is sweet in odour, resulting in gradual diminition of udalthathus.

Siddhars also described that 20 types of pramegam according to tridhoshas and are described on the basis of colour, consistency, taste, smell, weight, sedimentation etc.

The evidence or proof for this disease has been described by "Yugi Munivar" in his text "Vaidhya Chinthamani 800". Four varieties under vatham, Six due to pitham, and ten due to kabam. One among in Pitha is called Madhu megam.

The signs and symptoms of "madhumegam" in siddha text may be correlated with that of "Diabetes mellitus" in modern science.

Accorging to Yugimuni & Agasthiar this disease is due to Kanma or Karmam that is hereditary, also due to dietetic variations. According to "Nadi Nool" it is said to be due to over indulgence in sex. Pittha thadhu is highly accountable for the maintenance of life process, with proper treatment the severity of the disease can be controlled by potent drugs with diet regimen and yoga.

Diabetes mellitus is a clinical syndrome charecterised by hyperglycemia caused by absolute or relative deficiency of Insulin.[XI]

It has 3 types 1.Type I
2.Type-II
3.Gestational type.

Type 2 diabetes is a more complex condition than Type 1 diabetes because there is a combination of resistance to the actions of insulin in Liver and muscle together with impaired pancreatic β-cell function leading to 'relative' insulin deficiency.

According to the World Health Organization In 2000 B.C the age group of 20-44 years have been affected in 35 millions of world population. It is increased to 58 million in this age group at 2030 A.D

Age group: 45-64 years,	In 2000 A.D.---------	82millions
	In 2030 A.D.---------	174 millions
Age group: 65+ years,	In 2000 A.D.----------	56 millions
	In 2030 A.D.---------	130 millions

The increase in incidence of diabetes in developing countries follows the trend of urbanization and lifestyle changes, perhaps most importantly a "Western-style" diet.

***India: The Diabetic Capital of The World**:*

The International Diabetes Federation recently published findings revealing that in 2007, the country with the largest numbers of people with diabetes is India (40.9 million), followed by China (39.8 million), the United States (19.2 million), Russia (9.6 million) and Germany (7.4 million).[XII]

The modern clinical entity "Diabetes Mellitus" resembles one of the variety of pittha prameham ie. "Madhumegam" very closely. The former being a metabolic disorder caused by insufficient insulin action or its deficiency characterised by raised blood sugar level, the chief clinical features are polyuria, polyphagia, polydipsia, ketonuria, hypokalemia, cellular dehydration etc. The author is very obliged to do this work and to prepare some facts in this disease and principles involved in the care of this disease.

The formulation, "Kandha Chenduram" is indicated for Madhumegam in Siddha text "Kannusamy Parambarai Vaithiyam".

Hence the author has selected the medicine "Kandha Chenduram" for Hypoglycemic Activity in the management of Madhumegam (T_2 Diabetes Mellitus).

AIM AND OBJECTIVE

AIM

To evaluate the safety and efficacy of "Kandha Chenduram" for Hypoglycemic Activity in the management of Madhumegam [Diabetes Mellitus].

OBJECTIVE

PRIMARY OBJECTIVE:

To evaluate the Hypoglycemic Activity of "Kandha Chenduram" in preclinical studies.

SECONDARY OBJECTIVE:

Biochemical analysis:

To evaluate the efficacy of "Kandha Chenduram" for Hypoglycemic Activity in the management of Madhumegam [Diabetes Mellitus].

Collections of evidences in siddha literature

Collection of evidences in mineralogical aspects

ICPOES

Toxicological Study:

- Acute toxicity
- Su- acute toxicity

Pharmacological Study:

- Hypoglycemic activity

Clinical study:

- Pilot study on trial drug

MATERIALS AND METHODS:

STANDARD OPERATIVE PROCEDURE:

Collection and Authentication of the raw drugs:

The drug was procured from Ramasamy Chetty shop Paris, Chennai and authenticated by competent authority in, the Head of department Gunapadam.

Ingredients:[XII]

Purified Kandham (magnetic oxide ofiron)

Manjal(Potrilai)Kaiyanthakarai charu(wedelia chinensis),

Sotrukatrazhai charu (aloe vera),

Navalpattaicharu (bark of Syzygium cumini),

Arasampattaicharu (bark of Ficus religiosa),

Ezhumichampazhamcharu (Citrus limon)

Purification process:

Purification of Kandham:

Blow the 2-3 palams of Kandham (Magnetic Oxide of Iron) by using the blower, till the red color is formed and then soaked in the cow's urine. The same procedure is repeated for 7 times.

Preparation of the medicine:

The purified Kandham was made into a fine powder by the Kalvam. Then the Kandham was grinded by the juice of wedelia chinensis little by little for 9,12 hours (3,4 samam) and made in to villai. The villai was dried and placed in a Mudpot covered by another Mudpot with clay pasted cloth. Then it was made for Pudam with 20-25 cow dung cake, after the heat was decreased in the Pudam. It was taken and the same repeated with wedelia chinensis juice. The same procedure was repeated with Aloe vera juice, Syzygium cumini juice, Ficus religiosa juice, Citrus lemon juice and made for Pudam twice for each other juices. Then the chenduram is collected in a clean, air tight glass container.

LABELLING:

Name of the preparation	: Kandha Chenduram
Color	: Reddish orange
Quantity of the drug	: 2 gm
Dose	: 130 mg, bid
Adjuvant/ vehicle	: Ghee
Indication	: Madhumegam [Diabetes Mellitus].
Date of manufacturing	: 14/07/2012
Date of expiry	: 75 years from the date of manufacture

REVIEW OF LITERATURE

காந்தம் - MAGNETIC OXIDE OF IRON[XIV]

வேறு பெயர்:

சிவலோகச் சேவகன்

தரணிக்கு நாதம்

சூத அங்குசம்

நவலோகத் துரட்டி

காயசித்திக்கு பாத்திரவான்

முருகன் புராணம்

பொதுக்குணம்:

காந்தத்தாற் சோபைகுன்மங் காமில**மே கம்**பாண்டு
சேர்ந்ததிரி தோடவெட்டை சீதங்கால் - ஓய்ந்தபசி
பேருதரங் கண்ணோய் பிரமியநீ ராமையும்போம்
ஓரினிறை யாயுளுறும் உன்.

பொழிப்புரை:

காந்தக்கல் வீக்கம், குன்மம், காமாலை, **மேகம்,** பாண்டு, முத்தோடம்,வெள்ளை வீழல், சீதளம், வாதநோய், மந்தம், மகோதரம், விழிநோய், பிரமியம், நீராமைக்கட்டி முதலிய நோய்கள் நீங்கும். பூரண ஆயுளும் உண்டாம்.

மஞ்சள் கரிசாலை - Wedelia chinensis[XV]

வேறுபெயர்:

பொற்றலைக் கையாந்தகரை,

மஞ்சள் கையாந்தகரை

பயன்படும் உறுப்பு: பூண்டு

சுவை : கைப்பு

தன்மை : வெப்பம்

பிரிவு : கார்ப்பு

செய்கை:

பித்த நீர்ப்பெருக்கி	பித்தகாரி	Cholagogue
உரமாக்கி	பலகாரி	Tonic
உடற்றேற்றி	வ்யதடேதகாரி	Alterative
வாந்தியுண்டாக்கி	வமனகாரி	Emet
நீர்மலம்போக்கி	வ்ரேசனி	Purgative
வீக்கமுருக்கி	சோபாநாசினி	Deobstruent
ஈரல்தேற்றி	யகிருதபலகாரி	Hepatotonic

Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Class	: Dicots
Sub-class	: Gamopetalae
Series	: Inferae
Order	: Asterales
Family	: Asteraceae
Genus	: Wedelia
Species	: W.chinensis
Botanical name	: Wedelia chinensis

Chemical constituent:[XVI]

Ecliptine present in leaves.

Pharmacological activity:

It is an interesting source of potential bioactive molecules, as iridoids compounds, flavonoids, diterpenoids derivatives, phytosteroids, with antioxidant, anti-inflammatory, antimicrobial, Hepatoprotective activity, analgesic and antihistamine, Anti-implantation, antiasthmatic activities and anticancer activity.

சோற்றுக் கற்றாழை[XVII] **- Aloe vera**, mill

வேறு பெயர்:

கன்னி

குமரி

பிறமொழிகள்:

English	: Indian Aloes, Curacao aloe
Telugu	: Kalapanda
Malayalam	: Kattuvazha
Kannada	: Kathalai gidsa, lolisara
Sanskrit	: Kumari
Hindi	: Ghikauvar

பயன்படும் உறுப்பு: சாறு

சுவை	: சிறுகைப்பு
தன்மை	: தட்பம்
பிரிவு	: இனிப்பு

செய்கை:

உரமாக்கி	பலகாரி	Tonic
உடற்தேற்றி	வியாதாபேதகாரி	Alterative
நீர்மலம்போக்கி	விரேசினி	Purgative
ருது உண்டாக்கி	ருதுவர்த்தினி	Emmenagogue

பொதுகுணம்:

பொல்லா**மே கங்**கபம்பு முச்சூலை குட்டரசம்
அல்லார்மத் தம்பகந்த ரங்குன்மம் எல்லாம்விட்
டேகு மரிக்கு மெரிச்சற் **கிரிச்சரமு**
மாகு மரிக்கு மருண்டு.

பொழிப்புரை:

குமரியால் **வாதமேகம்**, கருமேகம், கிருமிக்குத்தல், பெருவியாதி, மூலம், உன்மாதம், பகந்தரம், குன்மம், **பித்தகிரிச்சரம்** இவை போம்.

Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Class	: Monocots
Order	: Asparagales
Family	: Xanthorrhoeaceae
Subfamily	: Asphodeloideae
Genus	: Aloe
Species	: A.vera
Botanical name	: Aloe vera, mill

Pharmacology activity:[XVIII]

Anti-inflammatory, anti-bacterial, anti-viral, anti-oxidant and energy tonic

Uses:[XIX]

There is preliminary evidence that *Aloe vera* extracts may be useful in the treatment of diabetes.

நாவல்[xx] **- Syzygium cumini.** Linn

வேறுபெயர்:

நவ்வல்

நம்பு

சம்பு

சாதவம்

ஆருகதம்

நேரேடு

நேரேடம்

சாட்டுவலம்

சாம்பல்

சுரபிபத்திரை

பிறமொழிகள்:

English	: Jambul
Telugu	: Neradu
Malayalam	: Gnaval
Kannada	: Neralu
Sanskrit	: Jambu
Hindi	: Jamuns
Duk	: Jamoon

பயன்படும் உறுப்பு: எல்லாப் பொருளும் (பட்டை)

பட்டை : சுவை : துவர்ப்பு

தன்மை : தட்பம்

பிரிவு : கார்ப்பு

செய்கை: துவர்ப்பி ஸங்கோசனகாரி Astringent

பொதுகுணம்:

மாந்தம் விளையும் வலிகரப்பா னுண்டாகும்
சேர்ந்ததொரு **நீரிழிவு**ஞ் சேருமோ - நாந்தலொடு
வாய்வுங் கடுப்பும் வருங்கொதிப்புந் **தாகமும்**பொம்
தூயநா வற்பழத்தால் சொல்.[XXI]

பொழிப்புரை:

நாவற்பட்டையால் கடுவன், கரப்பான், மாந்தம் இவை உண்டாம். **நீரிழிவு**, வெப்பம், வாயு, கடுப்பு, **நீர்வேட்கை** இவைகள் நீங்கும்.

Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Class	: Monocots
Seris	: Calyciflorae
Order	: Myrtales
Family	: Myrtaceae
Genus	: Syzygium
Species	: S.cumini
Botanical name	: Syzygium cumini, Linn

Pharmacological study:[XXII]

Tea, extracts, solutions, and other preparations from plants with a putative antihyperglycemic effect have a worldwide utilization in the treatment of diabetes (1). Among them, the tea prepared from leaves of jambolan [*Syzygium jambos* (L.) Alst or *Syzyguium cumini* (L.) Skeels] is largely used in our city (2) and elsewhere (3). We demonstrated that the tea and extracts from different parts of the plant had no effect in normal rats (4), rats with streptozotocin-induced diabetes (5), and normal volunteers (6). An antihyperglycemic effect in patients with diabetes, however, could not be ruled out, since its mechanism of action could depend on specific abnormalities of diabetes in humans.

In this double-blind, double-dummy clinical trial, we randomized patients with type 2 diabetes to receive a tea prepared from leaves of *Syzygium cumini* (two grams per liter of water, taken as water substitute) plus placebo tablets, placebo tea (prepared with dried leaves of *Imperata braziliensis* Trinius) plus glyburide tablets (5 mg twice a day), or placebo tea plus placebo tablets.

Fasting blood glucose levels decreased significantly in participants treated with glyburide and did not change in those treated with the *Syzygium cumini* tea and in the participants who received placebos from tea and glyburide. BMI, creatinine, γ-glutamyl transferase, alkaline phosfatase, SGOT, SGPT, 24-h glicosuria, 24-h proteinuria, triglycerides, and total, LDL, and HDL cholesterol did not vary significantly among the groups.

With this clinical trial, we have completed a cycle of experiments showing that the tea and extracts prepared from leaves of *Syzygium cumini* are pharmacologically inert. Patients and physicians should not rely on the putative antihyperglycemic effect of this tea, and perhaps of other folk medicines, that pretend to have such an effect. The investigation of plants with potential clinical utility could start with a clinical trial testing the effect of folk preparations in order to isolate the active principles of those products that show pharmacological activity in this model.

அரசு[XXIII] **- Ficus religiosa**. Linn.

வேறுபெயர்:

அஸ்வத்தம்

அச்சுவத்தம்

திருமரம்

கவலை

பேதி

பணை

கணவம்

சராசனம்

பிப்பிலம்

பிறமொழிகள்:

English	: The peepul tree; Sacred fig
Telugu	: Ravichettu
Malayalam	: Areyal, arasu
Kannada	: Aswathamaram, Pimpala
Sanskrit	: Aswadtha
Urudu	: Peepul paras
Hindi	: Pipol
Duk	: Anipeepul

பயன்படும் உறுப்பு: இலை, வித்து, **பட்டை**, வேர்

பட்டை : சுவை : துவர்ப்பு

தன்மை : தட்பம்

பிரிவு : இனிப்பு

செய்கை:

துவர்ப்பி	ஸங்கோசனகாரி	Astringent

Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Class	: Dicots
Sub-class	: Monochlamydeae
Seris	: Unisexuales
Family	: Urticaceae
Sub-family	: Moraceae
Genus	: Ficus
Species	: F.religiosa
Botanical name	: Ficus religiosa, linn

Pharmacological activity:[XXIV]

Andtidiabetic activity, Analgesic activity, Anti-inflammatory activity, Anti-oxidant Activity, anti convulsant, Anti microbial Activity, wound healing, Anti-amnesic activity, Anti-acetylcholinesterase Activity, Proteolytic Activity.

Antidiabetic activity:

Aqueous extract of F.religiosa in a dose of 50 and 100mg/kg shows pronounced reduction in blood glucose levels in normal, glucose-loaded hyperglycemic and streptozotocin (STZ) induced diabetic rats and effect was compared with glybenclamidea well known hypoglycemic drug. Aqueous extract of F.religiosa showed significant increase in serum insulin, body weight, glycogen content in liver and skeletal muscle of STZ-induced diabetic rats, also reduced the serum triglyceride and total cholesterol level. The result suggested potential traditional use of *F. religiosa*. Ambike et al investigated that a phytosterolin isolated from *F. religiosa* root bark when given at a dose of 25mg/kg orally to fasting rabbits produced maximum fall of the blood sugar level, equivalent to 81% of the tolbutamide standard, after 4 hrs, while with *i.v.* injections of 5-7.5 mg/kg a maximum effect was achieved after 2 hr.

எலுமிச்சம்பழம்[XXV] **- Citrus limon** (Linn) Burm.f.

வேறுபெயர்:

சம்பீரம்

சதாபலக்கனி

பயன்படும் உறுப்பு: இலை, காய், பழம், பழரசம், எண்ணெய்.

பழம்: சுவை : புளிப்பு

தன்மை : வெப்பம்

பிரிவு : கார்ப்பு

செய்கை:

குளிர்ச்சியுண்டாக்கி சீதளகாரி Refrigerant

பொதுகுணம்:

தாகம் குநகநோய் தாழாச் சிலிபதநோய்
வேகங்கொள் உன்மாதம் வீறுபித்தம் - மாகண்ணோய்
கன்னனோய் வாந்தியும்போங் கட்டுவா தித்தொழிலில்
மன்னெலுமிச் சங்கனியை வாழ்த்து.

Classification:

Kingdom	: Plantae
Clade	: Angiosperms
Class	: Dicots
Sub-class	: Polypetalae
Seris	: Disciflorae
Order	: Geraniales
Family	: Rutaceae
Genus	: Citrus
Species	: C.limon
Botanical name	: Citrus limon (Linn) Burm.f.

Pharmacological activity:[XXVI]

Hypoglycemic activity

PHYSICAL PROPERTIES

Materials and Methods

The Physical properties of Kandha Chenduram were analysed in the following procedure.

pH at 10% of aqueous solution:

5gm of Kandha Chenduram was weighed accurately and placed in clear 100 ml beaker. Then 50 ml of distilled water was added to it and dissolved well. After 30 minutes it was then applied in to pH mater at standard buffer solution of 4.0,7.0,9.2.

Ash Values

The Ash values are a measure of the inorganic constituents present in the raw drug. A high ash content explains its unsuitable nature to be used as a drug

Total Ash

A little of extract was taken in a silica crucible previously ignited, cooled and weighed. It was incinerated by gradually increasing the heat not exceeding dull red heat (450°C) until free from carbon, cooled and weighed. The percentage of ash was calculated with reference to air- dried drug. The procedure was repeated to get the constant weight.

Water soluble ash

The total ash was boiled with 25 ml water and filtered through ash less filter paper (Whatmann 4.1). It was followed by washing with hot water .The filter paper was dried and ignited in the silica crucible, cooled and the water insoluble ash was weighed. The water-soluble ash can be calculated by subtracting the water insoluble ash from the total ash.

Acid insoluble ash

The total ash obtained was boiled for 5 minutes with 25 ml of (10% w/v) dilute hydrochloric acid and filtering through ash less filter paper (Whatmann 4.1). The filter paper was ignited in the silica crucible, cooled and insoluble ash was weighed.

BIO -CHEMICAL ANALYSIS OF KANDHA CHENDURAM

The biochemical analysis of "Kandha Chenduram" was carried out in the Biochemistry lab, NIS

Appearance of sample		**Reddish orange in colour**	
S.No	EXPERIMENT	OBSERVATION	INFERENCE
1.	**Solubility:** a. A little (500mg) of the sample is shaken well with distilled water. b. A little (500mg) of the sample is shaken well with con. HCl/Con. H_2So_4	Sparingly soluble	Absence of Silicate
2.	**Action of Heat:** A small amount (500mg) of the sample is taken in a dry test tube and heated gently at first and then strong.	No White fumes evolved	Absence of Carbanate
3.	**Flame Test:** A small amount (500mg) of the sample is made into a paste with con. HCl in a watch glass and introduced into non-luminous part of the Bunsen flame.	No Bluish green flame appeared	Absence of copper
4.	**Ash Test:** A filter paper is soaked into a mixture of sample and dil. cobalt nitrate solution and introduced into the Bunsen flame and ignited	Yellow colour flame appeared	Presence of Sodium

Preparation of Extract:

5gm of Kandha Chenduram is weighed accurately and placed in a 250ml clean beaker and added with 50ml of distilled water. Then it is boiled well for about 10 minutes. Then it is cooled and filtered in a 100ml volumetric flask and made up to 100ml with distilled water.

I.Test For Acid Radicals

S.No	EXPERIMENT	OBSERVATION	INFERENCE
1	**Test For Sulphate :** 2ml of the above prepared extract is taken in a test tube to this added 2ml of 4%dil. ammonium oxalate solution.	No cloudy appearance appeared	Absence of sulphate
2	**Test For Chloride:** 2ml of the above prepared extracts is added with 2ml of dil-HCl is added until the effervescence ceases off.	cloudy appearance appeared	Presence of chloride
3	**Test For Phosphate:** 2ml of the extract is treated with 2ml of ammonium molybdate solution and 2ml of con.HNO_3	Yellow appearance not present	Absence of Phosphate
4	**Test For Carbonate:** 2ml of the extract is treated with 2mldil. magnesium sulphate solution	No Cloudy appearance present	Absence of Carbanate
5	**Test For Fluoride & Oxalate:** 2ml of extract is added with 2ml of dil. Acetic acid and 2ml dil.calcium chloride solution and heated.	No Cloudy appearance	Absence of fluoride and oxalate

6	**Test For Nitrate:** 1gm of the substance is heated with copper turning and concentrated H2SO4 and viewed the test tube vertically down	No brown gas evolved	Absence of nitarte
7	**Test For Sulphide:** 1gm of the substance is treated with 2ml of con. HCL	No Rotten Egg Smelling gas evolved	Absence of sulphide
8	**Test For Nitrite:** 3drops of the extract is placed on a filter paper, on that-2 drops of dil.acetic acid and 2 drops of dil. Benzidine solution is placed.	No characteristic changes	Absence of Nitrite
9	**Test For Borate:** 2 Pinches (50mg) of the substance is made into paste by using dil.sulphuric acid and alcohol (95%) and introduced into the blue flame.	Bluish green colour flame not appeared	Absence Of Borate
II. Test For Basic Radicals			
1	**Test For Lead:**2ml of the extract is added with 2ml of dil.potassium iodine solution.	No Yellow Precipitate is obtained.	Absence of lead
2	**Test For Copper:**One pinch (50mg) of substance is made into paste with con. HClin a watch glass and introduced into the non-luminuous part of the flame.	No Blue colour precipitate formed.	Absence of Copper

3	**Test For Aluminium:** To the 2ml of extract dil.sodium hydroxide is added in 5 drops to excess.	No Yellow colour appeared	Absence of Aluminium
4	**Test For Iron:** a. To the 2ml of extract add 2ml of thiocyanate ammonium solution b. To the 2ml of extract add 2ml of thiocyanate ammonium solution and 2ml of con HNO_3 .	Red colour appeared	a.Absence of iron b.Presence of iron
5	**Test For Zinc:** To 2ml of the extract dil.sodium hydroxide solution is added in 5 drops to excess and dil.ammonium chloride is added.	White precipitate is not formed	Absence of Zinc
6	**Test For Calcium:** 2ml of the extract is added with 2ml of 4% dil.ammonium oxalate solution	Cloudy appearance and white precipitate is obtained	Presence of Calcium
7	**Test For Magnesium:** To 2ml of extract dil.sodium hydroxide solution is added in drops to excess.	No White precipitate is obtained	Absence Of Magnesium
8	**Test For Ammonium:** To 2ml of extract 1 ml of Nessler's reagent and excess of dil.sodium hydroxide solution are added.	No Brown colour appeared	Absence of Ammonium

9	**Test For Potassium:** A pinch (25mg) of substance is treated off with 2ml of dil.sodium nitrite solution and then treated with 2ml of dil.cobalt nitrate in 30% dil.glacial acetic acid.	No yellowish precipitate is obtained	Absence of Pottasium
10	**Test For Sodium**: 2 pinches (50mg) of the substance is made into paste by using HCl and introduced into the blue flame of Bunsen burner.	Yellow colour flame appeared	Presence of sodium
11	**Test For Mercury**: 2ml of the extract is treated with 2ml of dil.sodium hydroxide solution.	Yellow precipitate is not obtained	Absence of Mercury
12	**Test For Arsenic:** 2ml of the extract is treated with 2ml of dil.sodium hydroxide solution.	No Brownish red obtained	Absence of Arsenic
	III.Miscellaneous		
1	**Test For Starch:** 2ml of extract is treated with weak dil.iodine solution	No blue colour devolopped	Absence of Starch
2	**Test For Reducing Sugar:** 5ml of Benedict's qualitative solution is taken in a test tube and allowed to boil for 2 minutes and added 8 to 10 drops of the extract and again boil it for 2 minutes. The colour changes are noted	Brick red colour not devolopped	Absence of reducing sugar

3	**Test For The Alkaloids:** a) 2ml of the extract is treated with 2ml of dil.potassium lodide solution. b) 2ml of the extract is treated with 2ml of dil.picric acid. c) 2ml of the extract is treated with 2ml of dil.phosphotungstic acid.	Yellow colour not developed	Absence of alkaloid
4	**Test For Tannic Acid:** 2ml of extract is treated with 2ml of dil.ferric chloride solution	No black precipitate obtained	Absence of Tannic acid
5	**Test For Unsaturated Compound:** To the 2ml of extract 2ml of diluted Potassium permanganate solution is added.	Potassium permanganate solution is not decolourised	Absence of Unsaturated compounds
6	**Test For Amino Acid:** 2 drops of the extract is placed on a filter paper and dried well. 20ml of Biurette reagent is added.	Violet colour developed	Presence of Aminoacid
7	**Test For Type Of Compound:** 2ml of the extract is treated with 2 ml of dil.ferric chloride solution.	No Green, red, violet. Blue colour developed	Absence of Oxy quinole, Pinephrine and Pyro catechol Anti pyrine, Aliphatic amino acids and meconic acid are absent Apomorphine salicylate and Resorcinol are absent Morphine, Phenol cresol and hydro uinone are absent

ICP –OES

METHODOLOGY:

ICP, abbreviation for Inductively Coupled Plasma, is one method of optical emission spectrometry. When plasma energy is given to an analysis sample from outside, the component elements (atoms) are excited. When the excited atoms return to low energy position, emission rays (spectrum rays) are released and the emission rays that correspond to the photon wavelength are measured. The element type is determined based on the position of the photon rays, and the content of each element is determined based on the rays' intensity.

To generate plasma, first, argon gas is supplied to torch coil, and high frequency electric current is applied to the work coil at the tip of the torch tube. Using the electromagnetic field created in the torch tube by the high frequency current, argon gas is ionized and plasma is generated. This plasma has high electron density and temperature (10000K) and this energy is used in the excitation-emission of the sample. Solution samples are introduced into the plasma in an atomized state through the narrow tube in the center of the torch tube.

Sample preparation:

- Solids cannot be analyzed directly. Such samples should be made into clear aqueous medium quantitatively. When acids are used to prepare solutions care should be taken. The concentration of the acids in the final provided solution should not be more than 2% v/v. highly acidic and organic solutions cannot be analyzed. As a guide line weigh exactly, around 200mg of substance and dissolve in 5mL of 5% of water or aqua regia or whatever acid to make 100mL of final solution. Make proper dilutions, if necessary. Free HF should not present in the final solution to be aspirated.
- Ideal concentration is around 100 ppm of the element of interest.
- Total dissolved solids should be not more than 0.2% w/v in the final solution.
- Very dilute solution may not give reliable results. Each element has a detection limit.
- A minimum solution volume of 25 ml is necessary for analysis.

- In ICP intensity of light emitted when the sample “sprayed or aspirated into an argon plasma” is measured at different wavelengths. The intensity of light at a given wavelength will be proportional to a particular elemental ion concentration. The intensity is calibrated with known standard concentration. For accurate quantitative results It is necessary to simulate the sample matrix condition with that of the standard. Each element generally will have many emission lines and the sensitivity is different for each of this wave length. When more than one element is present it is quite common that some emission lines interfere due to overlapping.
- It is preferable to use plastic containers for sample handling and preserving samples for ICP-OES analysis. Glass containers can give problems especially when analyzing certain metal ions at low concentration.
- Thus the Sample of Kandha Chenduram was prepared.
  Then, the prepared sample was analysed in the ICP-OES technique

TOXICOLOGICAL STUDY

ACUTE AND SUB ACUTE TOXICITY STUDY ON KANDHA CHENDURAM

Animals

Mice of either sex weighing 25-30gm and rats weighing 210-240gm were obtained from the animal house of Vels University. The animals were used with the approval of the Institute Animal Ethics Committee and obtained from Vels University, Chennai. They were fed with a balanced standard pellet diet and maintained under standard laboratory conditions, providing 24-28^{0}C temperature, standard light cycle (12 hr light, 12 hr dark) and water ad libitum. Animals were kept in cages with raised floors of wide mesh to prevent coprophagy. Animal welfare guidelines were observed during the maintenance period and experimentation. The rats were randomly assigned to control and different treatment groups, six animals per group. The animals were acclimatized for one week under laboratory conditions.

ACUTE TOXICITY STUDY-OECD 425 GUIDELINES

Acute oral toxicity test for the Kandha Chenduram was carried out as per OECD Guidelines 425. As with other sequential test designs, care was taken to ensure that animals are available in the appropriate size and age range for the entire study. The test substance is administered in a single dose by gavage using a stomach tube or a suitable intubation cannula. The fasted body weight of each animal is determined and the dose is calculated according to the body weight. After the substance has been administered, food was withheld for a further 2 hours in mice. The animals were observed continuously for the first 4 hr and then each hour for the next 24 hr and at 6 hourly intervals for the following 48 hr after administering of the test drug, to observe any death or changes in general behaviour and other physiological activities. Single animals are dosed in sequence usually at 48 hr intervals. However, the time interval between dosing is determined by the onset, duration, and severity of toxic signs. Treatment of an animal at the next dose was delayed until one is confident of survival of the previously dosed animal.

Observation of toxicity signs:

General behavior, respiratory pattern, cardiovascular signs, motor activities, reflexes, change in skin and fur, mortality and the body weight changes were monitored daily. The time of onset, intensity, and duration of these signs, if any, was recorded.

ACUTE ORAL TOXICITY STUDIES

Acute oral toxicity study was performed as per OECD-425 guidelines. Mice (n = 6) of either sex selected by random sampling technique were used for acute toxicity study. The animals were kept fasting for overnight providing only water, after which the Kandha Chenduram in 2% CMC was administered orally at the different dose levels in up and down dosing schedule according to body weight by gastric intubation and observed for 14 days.

SUB-ACUTE TOXICITY

In a 28-days sub acute toxicity study, twenty four either sex rats were divided into four groups of 6 rats each. Group I that served as normal control was administered with distilled water (p.o.) while Groups II, III and IV were administered daily with the Kandha Chenduram (p.o.) for 28 days at a dose of 12.5, 25 and 50mg/kg respectively. The animals were then observed daily for gross behavioural changes and any other signs of subacute toxicity. The weight of each rat was recorded on day 0 and weekly throughout the course of the study, food and water consumption per rat was calculated. At the end of the 28 days they were fasted overnight, each animal was anaesthetized with diethylether, following which they were then dissected and blood samples were obtained by cardiac puncture into heparinised tubes. The blood sample collected from each rat was centrifuged with 3000 X g at $4^{o}C$ for 10 min to separate the serum and used for the biochemical assays.

Hematological and blood biochemical analyses:

At the end of the study, all animals were kept fasted for 16-18 hr and then anesthetized with anesthetic ether on the 28th day. Blood samples for hematological and blood chemical analyses were taken from retro orbital vein. Heparinized blood samples were taken for determining complete blood count (white blood cell count, differential white blood cell count, platelet count, red blood cell count, hematocrit, and hemoglobin) by semiautomated hematology analyzer. The serum from non-heparinized blood was carefully collected for blood chemistry and enzyme analysis glucose, creatinine, total protein, albumin, total and direct bilirubins, serum glutamate-oxaloacetate transaminase (SGOT), serum glutamate pyruvate transaminase (SGPT), and alkaline phosphatase (ALP)) were automatically determined using autoanalyzer.

Necropsy:

All rats were sacrificed after the blood collection. The positions, shapes, sizes and colors of internal organs were evaluated. The Spleen, Testes, Pancreas, Lung, Liver, Brain, Heart, Stomach, Intestine, Bone, Ovary, and Kidney tissues were excised from all rats to visually detect gross lesions, and weighed to determine relative organs weights and preserved in 10% neutral formalin for histopathological assessment. The tissues were embedded in paraffin, and then sectioned, stained with haematoxylin and eosin and were examined microscopically.

Statistical analysis

Values were represented as mean ± SEM. Data were analysed using one-way analysis of variance (ANOVA) and group means were compared using the Tukey-Kramer Multiple Comparisms Test using GraphPad Instat-V3 software. P values < 0.05 were considered significant.

RESULTS AND DISCUSSION

Animals were shown significant toxic clinical signs during the dosing period of 28 days. All animals from control and all the treated dose groups not survived throughout the dosing period of 28 days and it was found two animal dead after 24 days of treatment in moderate and high dose. Results of body weight determination of animals of control and different dose groups exhibited comparable body weight gain throughout the dosing period of 28 days. During dosing period, the quantity of food consumed by animals from different dose groups was found to be comparable and normal with that of control animals.

Ophthalmoscopic examination of animals in control and Kandha Chenduram treated group revealed minor but remarkable abnormality. Urine analysis data of control group and treated group of animals determined in week 4 did not reveal any significant abnormalities except colour and pH changes. Comparison of organ weights of treated animals with respective control animals on day 28 was found to be comparable. Gross pathological examination of animals in control as well as the treated groups did not reveal any abnormalities.

The results of haematological investigations conducted on day 28, revealed following significant changes in the values of different parameters investigated when compared with those of respective controls; However, the increase or decrease in the values obtained was within normal biological and laboratory limits. Results of Biochemical investigations revealed the few significant changes in the values of different parameters studied when compared with those of respective controls; however, the values obtained were within normal biological and laboratory limits.

CONCLUSION

Based on these findings, toxic effect was observed at both 25 and 50mg/kg of Kandha Chenduram treated via oral route over a period of 28 days. So, it can be concluded that the Kandha Chenduram can be prescribed for therapeutic use in human with the strict dosage reductions of upto 12.5mg/kg. body weight p.o.

PHARMACOLOGICAL STUDY[XXVII]

EVALUATION OF HYPOGLECEMIC ACTIVITY OF KANDHA CHENDURAM IN ALLOXON INDUCED DIABETIC RATS

MATERIALS AND METHODS:

Animals

Wistar albino rats (8–10 weeks) of both sexes were obtained from the animal house of School of Pharmacy, Vels University, Chennai. Before and during the experiment, rats were fed with standard diet (Sai durga foods, Bangalore). After randomization into various groups and before initiation of experiment, the rats were acclimatized for a period of 7 days under standard environmental conditions of temperature, relative humidity, and dark/light cycle. Animals described as fasting were deprived of food and water for 16 hrs ad libitm (No: XIII/VELS/43/2000/CPCSEA/IAEC/08.08.2012)

Drug administration

The drugs to be administered were calculated and suspended in vehicle (2% w/v suspension of carboxy methyl cellulose (CMC) in water 10 ml/kg b.w). The drug was administered continuously for 14 days orally using an oral feeding tube. The results were compared with that of the standard drug Glibenclamide which was also given continuously for 14 days.

Oral Glucose Tolerance Test

Rats were divided into five groups containing six animals in each group. All animals fasted before treatment. Group I was kept as vehicle control which received 2% w/v suspension of Carboxy Methyl Cellulose p.o., Group II received glucose only (2g/kg, p.o.), Group III received Kandha Chenduram 25 mg/kg, Group IV received Kandha Chenduram 50mg/kg. The rats of Group V were treated with Glibenclamide. Blood samples were collected by puncturing the retro orbital sinus just prior to drug administration, and 30, 90 minutes after loading glucose. Serum glucose level was measured immediately.

Experimental Design

Five groups of rats, six in each received the following treatment schedule.

Group I: Normal control (saline).

Group II: Alloxan treated control (150mg/kg.ip).

Group III: Alloxan (150mg/kg.i.p) + Kandha Chenduram 25mg/kg, p.o,

Group IV: Alloxan (150mg/kg.ip) + Kandha Chenduram 50mg/kg, p.o

Group V: Alloxan (150mg/kg.ip)+Standard drug, Glibenclamide(5mg/kg, p.o).

Kandha Chenduram and standard drug glibenclamide (5mg/kg) and saline were administered with the help of feeding cannula. Group I serve as normal control, which received saline for 14 days. Group II to Group V are diabetic control rats. Group III to Group V (which previously received alloxan) are given a fixed dose Kandha Chenduram (25mg/kg, p.o), (50mg/kg, p.o) and standard drug glibenclamide (5mg/kg) for 14 consecutive days.

Induction of Diabetes in Experimental Animals

Rats were made diabetic by a single intraperitoneal injection of alloxan monohydrate (150mg/kg). Alloxan was first weighed individually for each animal according to the body weight and then solubilized with 0.2ml saline just prior to injection. Two days after alloxan injection, rats with plasma glucose levels of >150mg/dl were included in the study. Treatment with Kandha Chenduram was started 48 hr after alloxan injection.

Collection of Blood Sample and Blood Glucose Determination

Blood samples were drawn from tail tip of rat at weekly intervals till the end of study. Fasting blood glucose estimation and body weight measurement were done on day 1, 7, and 14 of the study. Blood glucose estimation was done by one touch electronic glucometer using glucose test strips. On day 14, blood was collected from retro-orbital plexus under mild ether anesthesia from overnight fasted rats and fasting blood sugar was estimated.

Serum was separated and analyzed for serum cholesterol, serum triglycerides, serum HDL, serum LDL was estimated. The whole pancreas from each animal was removed after sacrificing the animal and was collected in 10% formalin solution, and immediately processed by the paraffin technique. Sections of 5μ thickness were cut and stained by haematoxylin and eosin for histological examination.

Statistical Analysis

All the values of body weight, fasting blood sugar, and biochemical estimations were expressed as mean±standard error of mean (S.E.M.) and analyzed for ANOVA and Dunnet's *t*-test. Differences between groups were considered significant at $P < 0.01$.

RESULTS AND DISCUSSION

Diabetes mellitus is considered as one of the five leading causes of death in the world. In modern medicine no satisfactory effective therapy is still available to cure diabetes mellitus. There is increasing demand by patients to use natural products with hypoglycemic activity due to side effects associated with the use of insulin and oral hypoglycemic agents. Alloxan, a beta cytotoxin, induces 'chemical diabetes' in a wide variety of animal species by damaging the insulin-secreting cells of the pancreas. Though not routinely used anymore, the oral glucose tolerance test (OGTT) is the gold standard for making the diagnosis of type 2 diabetes. It is still commonly used for diagnosing gestational diabetes also.

Literature sources indicate that alloxan rats are hyperglycemic. The use of alloxan (150 mg/kg b.w.) produced a partial destruction of pancreatic β-cells even though the animals became permanently diabetic. Thus, these animals have surviving β -cells and regeneration is possible. The acute oral toxicity study of Kandha Chenduram showed no mortality upto 250mg/kg. Since the Kandha chenduram was identified with remarkable toxicity at the higher dose in the acute toxicity study. Hence the stability and tolerance was observed at 250mg/kg dose level. From this one tenth dose was considered as median or therapeutic dose for the further pharmacological evaluation.

Administration of alloxan (150mg/kg, i.p.) lead to 1.2-fold elevation of fasting blood glucose levels, which was maintained over a period of 2 weeks. Alloxan caused body weight reduction ($P<0.01$), which is reversed by Kandha Chenduram at the dose (25mg/kg) is more effectively after 14 days of treatment. The supplementation of Kandha Chenduram improved the glucose tolerance in the fasted normal rats. After that serum glucose level was lowered significantly ($P<0.05$) at 30 minutes and varied significantly ($P<0.01$) lowered at 90 minutes. On repeated administration of Kandha Chenduram at doses of 25mg and 50mg/kg b.w. for 14 days, a significant ($P < 0.01$) dose-dependent decrease in blood glucose of the diabetic rats was seen as compared to the vehicle-treated control group.

The control rats had the blood glucose level 74.64±2.4mg/dl while untreated diabetic rats showed 225.17±16.64mg/dl blood glucose level. Kandha Chenduram treated rats showed significant reduction in blood glucose levels. On day 5 of treatment at 25mg dose of Kandha Chenduram reduced the blood glucose level to 186.20±10.15mg/dl ($P<0.01$) while 50 mg dose reduced the level to 162.45±12.00mg/dl ($P<0.01$). Glibenclamide treated rats showed expected hypoglycemic effects i.e. blood glucose level of 120.10±3.12mg/dl. On day 14, the glucose level was reduced more significantly 109.17±2.48 and 102.56±2.33 in both the dose of Kandha Chenduram and the results are comparable to the effects shown by standard Glibenclamide.

Diabetes mellitus is a chronic disorder caused by partial or complete insulin deficiency, which produces inadequate glucose control and leads to acute and chronic complications. Premature and extensive arteriosclerosis involving renal, peripheral, and cardiovascular vessels remain the major complication of diabetes mellitus. Alteration in the serum lipid profile is known to occur in diabetes and this is likely to increase the risk for coronary heart disease. A reduction in serum lipids, particularly of the LDL and VLDL fraction and triglycerides, should be considered as being beneficial for the long-term prognosis of these patients. In the biochemical evaluation the Kandha Chenduram altered the deviated parameters towards normal. Particularly, the total cholesterol was 71.28 ± 1.5, 76.12±1.6 ($P<0.01$) and the triglyceride was 68.2±2.17, 74.6 ± 2.35 ($P<0.01$) and the HDL was 132.30±0.41, 135.1±0.30 ($P<0.01$) and the LDL was 61.46±2.25, 53.22±0.62 ($P<0.01$) at the dose levels 25 and 50mg/kg of Kandha Chenduram respectively which was comparable with that of standard drug treated group values.

Lowering of blood glucose and plasma lipid levels through dietary modification and drug therapy seems to be associated with a decrease in the risk of vascular disease. Diabetic rats were observed to have increased plasma lipids, which are responsible for several cardiovascular disorders. The higher lipid levels seen in diabetic rats were due to increased mobilization of free fatty acids from peripheral depots and also due to lipolysis caused by hormones. The Kandha Chenduram leads to regeneration of the β-cells of the pancreas and potentiation of insulin secretion from surviving β-cells; the increase in insulin secretion and the consequent decrease in blood glucose level may lead to inhibition of lipid peroxidation and control of lipolytic hormones.

In present investigation, it was observed that Kandha Chenduram can reverse the effects of Alloxan induced diabetes to a significant level. Possible mechanisms brings about its hypoglycemic action may be by increasing either the pancreatic secretion of insulin from β-cells of islets of langerhans. This study results indicates that Kandha Chenduram have significant anti-hyperglycemic activities in alloxan-induced hyperglycemic rats without major change in body weight and improved the body weight & lipid profile along with serum creatinine, serum urea and serum alkaline phosphatase. The renewal of β cells in diabetes have been studied in several animal models. The total β cell mass reflects the balance between the renewal and loss of these cells. It was also suggested that regeneration of islet ß cells following destruction by alloxan may be the primary cause of the recovery of alloxan-injected rats from the effects. Kandha Chenduram has been shown to act by β cell regeneration. Hence the above discussion reveals that Kandha Chenduram at high dose (50mg/kg) is more effective as standard that is, glibenclamide (5mg/kg). Histopathological studies confirm the healing of pancreas, by Kandha Chenduram, as a possible mechanism of their antihyperglycemic activity.

Histopathological studies showed normal acini and normal cellular population in the islets of Langerhans in pancreas of control rats. Severe damage to the islets of Langerhans and reduced dimensions of islets results damage of pancreas in alloxan-treated diabetic control rats. The partial restoration of normal cellular population and enlarged size of β-cells with hyperplasia were shown by Kandha Chenduram. Restoration of normal cellular population size of islets with hyperplasia by Glibenclamide was seen.

CONCLUSION

Alloxan causes massive reduction in insulin release, through the destruction of β-cells of the islets of Langerhans. Kandha Chenduram did not show any effect on normal blood sugar levels but it effectively reversed the alloxan-induced changes in the blood sugar level and the β-cell population in the pancreas. This could be due to potentiation of the insulin effect of plasma by increasing the pancreatic secretion of insulin from existing β-cells of islets of Langerhans or its release from bound insulin. Diabetes mellitus is possibly the world's largest growing metabolic disease, and as the knowledge on the heterogeneity of this disorder is advanced, the need for more appropriate therapy increases. Traditional medicines like Kandha Chenduram can be used for a range of diabetic complications with lesser side effects.

DISEASE ASPECT

SIDDHA ASPECT

மதுமேகம்

According to siddhars the imbalance of Tridosha causes totally 4448 diseases to human being.Among them megarogam is considered to be the emperor of diseases.

"ஆமப்பா மனிதர் செய்த கன்மத்தாலே
அரகரா மேகமென்ற ராசாவாலே.[XXVIII]

Madhumegam has been described by many siddhars in their texts. The aetiology, pathogenesis, classification,clinical features, diagnosis and prognosis have been dealt in detail in these texts.

வேறு பெயர்: நீரிழிவு
வெகுமூத்திரம்
மது பிரமேகம்
இனிப்பு நீர்
மேக நீர்
தித்திப்பு நீர்

இயல்:

It is a clinical condition characterized by frequent passage of urine more than the normal resulting in deterioration and diminution of seven thathus.

"இனிப்பான இனிப்பல்ல ஈ வந்தாடும்
ஒரு துளிவாய் விட்டார்கைப் பிணியாய் தோன்றும்"[XXIX]

The above description quotes that ant and flies are attracted to the site of voided urine and when the urine is heated it gives honey odour .

"அண்மையாயடிக் கடிக்கு நீரிறங்கு
கடிக்கு அரைநாழி தனிலே காணும்
வெண்மையான தடியதனிற்றான் பிடிக்கும்
மிக்கான சடம் வெலுத்து மேனி கன்றும்"[XXX]

This poem comprises the clinical features of Madhumegam

நோய் வரும்வழி:

"கோதயர் கலவி போதை கொழுத்த மீன் இறைச்சி போதை
பாதுவாய் நெய்யும்பாலும் பரிவுடன் உண்பீராகில்
சோத பாண்டுருவ மிக்க சுக்கில பிரமேகந்தான்
ஓது நீரிழிவுசேர வுண்டெனஅறிந்து கொள்ளே"[xxxi]

The above poem quotes that excessive intake of rich food like ghee, fish, milk, toddy and excessive indulgence in sex leads to madhu megam.

"உற்பவிக்கும் பால் நெய்யால் இறைச்சி கொள்ளல்
வுரிசையாய மீந்தன்னால் அருவிருத்த
மற்பவிக்கும் பதார்தத்தால் மதுர வஸ்தால்
மந்தங்கள் தனைபுசித்தல் வேகாப் பண்டங்
குற்பவிக்குங் குளுத்த வன்ன மங்கை கோஷ்டி
குறித்த நித்திரை தவிர்த்தல் அக்கினி மந்தம்
தற்பவிக்குந் சரீரந்தான் மிகப் பருத்தற்
சஞ்சலந்தான் மிகப்பயத்தால் தரிக்கும் நோயே"[xxxii]

"இயம்பவே ஆறு குளம் பின்னஞ் செய்தல்
ஏற்றமாய் மாற்றான் பெண் சங்கம் செய்தல்
பயம்பவே பாலர்களுக் கொளித்து தின்னல்
நரை பூத்த கொங்கையாள் நாயகன் மோகத்தால்
மறை போற்றுங் கருப்பத்தில் வளர்ந்தது மேகமே"[xxxiii]

"ஸ்திரிபோகம் செய்ததினால் வேவுகொண்டு
சிரசு மட்டும் வெந்துருகிக்கனலே மீறிக்
குறியுடனே மேகந்தான் கொடுமை செய்து
குறைந்து வரும் தாதுவெல்லாம் குன்றிப்போகும்"[xxxiv]

"கன்னி மயக்கத்தால் கன்டிடு மேகமே"[xxxv]

"நிறை பூத்த கொங்கையாள் நாயகன் மோகத்தால்
மறை போற்றும் கருப்பத்தில் வளர்ந்தது மேகமே"[XXXVI]

"கிரந்தி புண்ணிரண மேகக்கீசகனெனுந் துன்மார்க்கன்
அருந்ததி என்னும் பாஞ்சாலி யன்னையைக் கண்ணுற்றானே"[XXXVII]

The conclusion from the above said, all Siddhars attribute Diabetes mainly due to excessive indulgence in sex which results in depletion of total strength of body as a whole, making the individual susceptible to this disease.

Psychosomatic Factors:

Yugimunivar and other Siddhars stress a great importance to Psychosomatic factor. All antisocial activities ultimately result in subjective guiltiness and psychosomatic stress resulting in disease like diabetes, peptic ulcer and hypertension.

"மதங்கொண்டு பெரியோரை வைகையாலும்
மாதர் கற்புநிலைமை தன்னை அழிக்கையாலும்
பதன்கொண்ட சிவயோகி சாபத்தாலும்
பத்துவகை சிலேற்பனங்கள் மேகநீராம்"[XXXVII]

கன்மநோய்:

In the views of Theraiyar, Agasthiar and Thirumoolar, Madhu megam also occurs as a result of bad deeds commited in his or her past or previous births.

"ஆமப்பா மனிதர் செய்த கன்மத்தாலே
அரகரா மேகமென்ற ராசாவாலே
காமப்பா லதினால் பசியுப்ப நாலுங்
கைக்கடங்கா நோய்கல் வரும் கர்மத்தாலே"[XXXIX]

நோய் எண்:

சொல்லுமென்று கேட்டவுடன் சிவனு மப்போ
தேவியைத்தான்முகம் பார்த்து வாராய் தேவி
அல்லுமென்றே மேகமது இரண்டு பத்து
மகிழ்ந்து நீ கேளுமென்று வசனித்தாரே"

"வசனித்த மேகமது இரண்டு பத்து
வாதத்திற் பிறந்த சலம் நாலேயாகும்
பிசனித்த பித்தத்தி லுற்பவித்த
பேரன சலந்தானு மாறுமாகும்
தேசனித்த சேட்டு மத்தில் உர்பவித்த
சீரன சலந்தானும் பத்தேயாகும்
இசனிந்த இதனுடைய குணாகுணங்கள்"[XL]

The saint Yugi classified Megam into 20 types. That is Vatham-4, Pitham-6, Kabam-10 types.

"தக்கதாரணி மானிடத்தோர்கள் கேள்பக்க மாசலம் வகையுமாமே
நக்கநாயகன் நாயகிக்கே சொல்மிக்க நந்தி விளம்பி விதித்ததே"
“சுழியும் வாதம்நான் காலும்கயம் பித்தமாறாலும்
கழியும் சேத்துமம்பத்தாலும் சொல்லும் நாலஞ்சாய்தோன்றும்
வழியும்வாதம் நான்காமே மாருதவிழ்தந் தன்னாலே"[XLI]

As per Thirumoolar Vaidyam 600, Prameham is also called as Premeham Neerizhivu. In Agasthiyar texts and "Yugi muni Vaidhya Chinthamani 800" Madhumegam is one among the 20 varieties of Prameham. Each author who have dealt mega disorders have differently classified them under three doshas and have given names according to their concept. But the number, signs and symptoms of the classified disorders are almost identical in the description of the disease. Different types of clinical disorders have been described on the basis of colour, consistency, taste and smell etc.

வகைகள் [XLII]

வாதத்தின் கீழ்:

- நெய்மண நீர்
- பசுமண நீர்
- ஊண்மண நீர்
- சீழ்மண நீர்

பித்தத்தின் கீழ்:

- யானைக் கொழுப்புநீர்
- கற்றாழை நீர்
- சுண்ணநீர்
- இனிப்பு நீர்
- பளிங்கு நீர்
- முயற்குருதி நீர்

கபத்தின் கீழ்:

- வசா நீர்
- தெளி நீர்
- மூளை உருக்குநீர்
- இள நீர்
- கள் நீர்
- சுக்கில நீர்
- தேன் நீர்
- உப்பு நீர்
- கழு நீர்
- இறைச்சி நீர்

Above 21 varieties are as follows[XLIII],

1.Muyarchiyal vantha Megam (Self acquired-6)

2.Karuppathal vantha Megam (Hereditary (or) Constitutional-5)

3.Palakkaarana Megam (Miscellaneous-7)

குறிகுணங்கள்:

கூறான மேகமது இருபதுக்கும்
குணந்தனை சிவன்சொல்ல தேவிகேட்க
தாறான தாகமொடு சோகமேகந்த்
தரியாமல் நீரிழித லிருமல் மூச்சு
ஆறான அருசிசத்தி சித்த பிரமை
அடிக்கடிக்குத் தண்ணீர்தா னன்னங் கேட்டல்
ஈறான இடுப்புக்குள் கடுப்பு காணல்
எலும்பு ழற்றலோ டெரிவுண்டாமே"
எரிவோடு சரீரமெல்லா மறைபட்டாற் போல்
எழிலுடம்பு நோதல் நித்திரை யில்லாமை
வரிவோடு மாய்வுமெத்த வும்பறித்தல்
மனது சஞ்சலப்படுதல் காற்று வேண்டல்
மெரிவோடு மேல்மூச்சு மிகவுண்டாதல்
விக்கலோடு மயக்கந்தான் மெத்தக் காணல்
தெரிவொடு தேகமெங்கும் வெளிருண்டாதல்
தேகமெத்த வாலோபப்படுதல் காணே
தன்மையாய் சலந்தானும் பசுப்பு மஞ்சள்
தானிறங்கும் பீசமுங் கோசமுங் கடுக்கும்
அண்மையா யடிக்கடிக்கு நீரிறங்கு
மடிக்கடிக்கு அரைநாழி தனிலேதானும்
வெண்மையாய டியதனிற் றான்பிடிக்கும்
மிக்கான்சடம் வெளுத்து மேனிகன்றும்
பண்மையாய்ப் பஞ்சவாண்ட தனிற்கொல்லும்
பகர்கின்றமது மேகத்தின் பாங்குதானே"[XLIV]

பொருள்:

- நீர்வேட்கை
- அடிக்கடி நீரிழிதழ்
- இருமல்
- மேல்மூச்சு
- சுவையின்மை
- சித்தம் கலங்கல்

- அடிக்கடி நீரும் சோறும் கேட்டல்
- இடுப்புக்கு அடுத்த எலும்பு உழன்று எரிதல்
- உடல் மெலிந்து நோதல்
- தூக்கமின்மை
- வாயு மிகுந்தும் பரிதல்
- மனக்கலக்கம்
- காற்று வேண்டுதல்
- சூடாக மூச்சு வெளியாதல்
- விக்கல்
- மயக்கம் மிகக் காணல்
- உடல் மிகவும் வெளுத்துப் போதல்

அவத்தைகள் :

Complications of madhumegam as "Avathaigal". There are ten avathaigal described one by one as follows.

"காணவே முதலவத்தை சரீரந்தானுங்
கனமாகப் பருத்திருகி நீர்த்துவாரம்
வேணவே வண்டாக்கி யகலம் பண்ணு
மிக்க விரண்டாஅவத்தை விளம்பக் கேளாய்
மூணவே மூத்திரப் பீடையுமாச் சுக்கில
முகமுழுத் தேஜசுதான் மிகவே குன்றும்
நாணவே மூன்றாகு மவத்தைக் குத்தான்
நாவறளும் வாயுவது மீறுந்தானே
தாறான நாலாமவத்தை யங்க தாகஞ்
சன்னியது பாதமுண்டா மைந்த வத்தைத்
தேறனா நீர்பெருகுந் தாது நட்டம்
நிலையாளு மவத்தை யுடற்கிடை கொள்ளாது
மூணான மூர்ச்சை வருமே ழவத்தை
மிக்கவஞ்ச ரோகஞ்சுவாச தேக சாட்டியம்
ஏனான எட்டாவ தவத்தைத் தானே
எழுகிரந்தி பிளவையுந் தான்மிக வுண்டாமே
உண்டாகு மொன்பதா மவத்தை கேளாய்
ஒழுக்கான வாசாரங் கிருமி யுண்டாம்

பண்பான பத்தாந் தானவத்தைக் கேளாய்

பாரமாய் சயங்கொண்டு பரத்துக் கேகும்"

வெண்டாகு மேகந்தா னிருபதுக்கும் விளங்கிய

தோர்தச வவத்தை விவரஞ் சொன்னோம்

அண்டாகுஞ் சாத்தியவ சாத்திய மிரண்டு

மறிந்துகொண்டு வடவாக வவிழ்தஞ் செய்யே![XLV]

பொருள்:

நீரிழிவில் காணும் பத்து அவைத்தைகள் ஒன்றன்பின் ஒன்றாக தொடரும். அவைகள்:

1. நோய் தோன்றுவதற்கு முதற்குறியாக உடல் பெருத்துக் கொண்டே வருவதோடு நீர்ப்புழை அகன்று வரும்.
2. நீர் பெருகி இழிவதோடு வெண்ணீர் கெட்டு உடலின் ஒளி குன்றிக் காணும்.
3. நாவறட்சியும், வயிற்றுள் காற்றுக் கூடிப் பெருக்கும்.
4. நீர்வேட்கை மிகுந்து முப்பிணித் தொடரும்.
5. சிறுநீர்ப் பெருகி இழிந்து விந்தை அழிக்கும்.
6. படுக்கையில் கிடக்கவொட்டது மூச்செரியும்.
7. வாய்க்குமட்டி சுவையற்றுப் பெருமூச்சுண்டாய் உடல் சோரும்.
8. உடலில் கழலை, கட்டி உண்டாம்.
9. உடலில் நுண்புழுக்கள் உண்டாய் உடலை மெலியச் செய்யும்.
10. இறுதியில் இளைப்புநோய் உண்டாய்க் கொல்லும்.

The above complications occur in undiagnosed and improperly treated cases.

The complications of madhumegam described in siddha text is really correlated with Diabetes mellitus in modern science.

முக்குற்ற வேறுபாடுகள்:

தன்வினை, பிறவினைகளின் அளவாக ஐயம் தன்னிலையில் கேடடைந்து கீழ்நோக்குங்கால் கெட்டு, அத்துடன் உடற்கட்டுகள் ஏழையும் ஒன்றன்பின் ஒன்றாய்க்கெடச் செய்து நாளடைவில் பசித்தீயைக் கெடுக்கும். ஊட்டம் தரும் பொருள்களை உண்ணினும், உடல் வன்மையடைவதில்லை. மாறாகக் கேடடைந்த அக்குற்றத்தால் மற்ற இரண்டும் தன்னிலை பிறழ்ந்து தங்களுக்குத் துணையாய்க் கால்(வாயுக்)களையும் கூட்டி ஏழு உடற்கட்டுக்களின் வன்மையைக் கெடச்செய்து பலவகைப்பட்ட நோய்க்ளையும் இந்நோய்க்குத் துணையாக்கும். இதனை,

“குறியுடனே மேகந்தான் கொடுமை செய்து

குறைந்து வரும் தாதுவெல்லாம் குன்றிப்போகும்"[XLVI]

என்பதால் அறியலாம்.

MODERN ASPECT

DIABETES MELLITUS

DEFINITION:

Diabetes mellitus is a clinical syndrome characterized by hyperglycaemia due to absolute or relative deficiency of insulin. Lack of insulin affects the metabolism of carbohydrate , protein and fat and causes a singnificant disturbance of water and electrolyte homeostasis.

EPIDEMIOLOGY:

Diabetes is worldwide in distribution and the incidence of both type 1 and type 2 diabetes is rising. It is associated with several contributory factors including increased longevity, obesity, unsatisfactory diet, sedentary lifestyle and increasing urbanization. Diabetes is the single most important metabolic diseases of humans. It can affect nearly every organ system in the body, and is recognized as one of the leading causes of death and disability worldwide.

India is "The diabetic capital of the world "as it is presently estimated to have over 40 million individuals affected by this deadly disease. It is expected to rise more rapidly in the future because of increasing obesity and reduced activity levels.

However, the prevalence of both types of diabetes varies considerably around the world, and is related to differences in genetic and environmental factors. A pronounced rise in prevalence occurs in migrant populations to industrialized countries, e-g: Asian and Afro-Carribbean immigrants to the United Kingdom. The prevalence of known diabetes in Britain is around 2-3%. Many more cases of type 2 diabetes remain undetected.

CLASSIFICATION:

ETIOLOGIC CLASSIFICATION OF DIABETES MELLITUS:

1.Type 1 diabetes (-cell destruction, usually leading to absolute insulin deficiency)

A. Immune-mediated

B. Idiopathic.

2.Type 2 diabetes (may range from predominantly insulin resistance with relative insulin deficiency to a predominantly insulin secretory defect with insulin resistance)

3.Other specific types of diabetes

- Genetic defects of cell function characterized by mutations in:
    - Hepatocyte nuclear transcription factor (HNF) 4 (MODY 1)
    - Glucokinase (MODY 2)
    - HNF-1 (MODY 3)
    - Insulin promoter factor (IPF) 1 (MODY 4)
    - HNF-1 (MODY 5)
    - Mitochondrial DNA
    - Proinsulin or insulin conversion
- Genetic defects in insulin action
    - Type A insulin resistance
    - Leprechaunism
    - Rabson-Mendenhall syndrome
    - Lipoatrophic diabetes
- Diseases of the exocrine pancreas-pancreatitis, pancreatectomy, neoplasia, cysticfibrosis, hemochromatosis, fibrocalculous pancreatopathy
- Endocrinopathies acromegaly, Cushing's syndrome, glucagonoma, pheochromocytoma, hyperthyroidism, somatostatinoma, aldosteronoma
- Drug- or chemical-induced Vacor, pentamidine, nicotinic acid, glucocorticoids, thyroid hormone, diazoxide, -adrenergic agonists, thiazides, phenytoin, interferon, protease inhibitors, clozapine, beta blockers
- Infections: congenital rubella, cytomegalovirus, coxsackie
- Uncommon forms of immune-mediated diabetes: "stiff-man" syndrome, anti-insulin receptor antibodies
- Other genetic syndromes sometimes associated with diabetes:
  Down's syndrome, Klinefelter's syndrome, Turner's syndrome, Wolfram's syndrome, Friedreich's ataxia, Huntington's chorea, Laurence-Moon-Biedl syndrome,myotonic ystrophy, porphyria, Prader-Willi syndrome.

4.Gestational diabetes mellitus (GDM)

MODY : Maturity onset of diabetes of the young.

Diabetes mellitus (DM) describes a group of chronic metabolic disorders characterized by hyperglycemia that may result in long-term microvascular, macrovascular, and neuropathic complications. These complications contribute to diabetes being the leading cause of: (a) new cases of blindness among adults, (b) end-stage renal disease, and (c) nontraumatic lower limb amputations. While prevention and treatment of DM remain a challenge, several studies have shown that complications associated with DM such as retinopathy and neuropathy can be delayed or prevented through proper blood glucose management.

The increased cardiovascular risk associated with DM contributes to it being the sixth leading cause of death in the United States. In 2007, diabetes caused approximately 284,000 deaths, accounted for more than 15 million workdays absent and an additional 107 million workdays lost due to unemployment disability. The financial impact of DM in 2007 was approximately $174 billion, or one of every five dollars spent on health care in the United States.3

EPIDEMIOLOGY AND ETIOLOGY:

DM is characterized by a complete lack of insulin, a relative lack of insulin, or insulin resistance as well as disorders of other hormones. These defects result in an inability to use glucose for energy. DM affects an estimated 23.6 million persons in the United States, or 7% of the population. While an estimated 17.9 million persons have been diagnosed, another 5.7 million people have DM but are unaware they have the disease. Worldwide, the number of people with DM is expected to rise to 35% by the year 2025.3 The increasing prevalence of DM is due in part to three influences: lifestyle, ethnicity, and age.

Lifestyle:

Sedentary lifestyle coupled with greater consumption of high-fat foods and larger portion sizes have resulted in increasing rates of persons being overweight or obese. Current estimates indicate that 65% of the U.S. population is overweight and of those, 30% are obese. Overweight is defined as a body mass index (BMI) of greater than 25 kg/m2, whereas a BMI of greater than 30 kg/m2 constitutes obesity. The Centers for Disease Control and Prevention (CDC) estimates that 25% to 33% of Americans do not engage in an adequate amount of daily activity.

Ethnicity:

In addition to current lifestyle trends and increased body weight, certain ethnic groups are at a disproportionately high risk for developing DM. Individuals of Native American, Native Alaskan, African American, and Hispanic/Latino American descent have 1.7 to 2.2 times greater risk of developing DM when compared with non-Hispanic whites.3 In addition, African American and Hispanic/Latino American populations are growing at a faster rate than the general U.S. population. This is a contributing factor to the rising U.S. population who has DM.

Age:

The third factor contributing to the increased prevalence of diabetes is age. The prevalence of DM increases with age from approximately 2% of individuals 20 to 39 years of age to 20.9% of individuals older than 60 years of age.3 As the population ages, the incidence of DM is expected to increase. Type 2 DM (T2DM) accounts for approximately 90% to 95% of all diagnosed cases, is progressive in its development, and is often preceded by prediabetes. A combination of insulin deficiency, insulin resistance, and other hormonal irregularities, primarily glucagon, are key problems with T2DM. The majority of people with T2DM are overweight and an increasing number of cases in children have been observed.

T2DM is usually slow and progressive in its development and is often preceded by prediabetes.

Risk factors for T2DM include:

•First-degree family history of DM (i.e., parents or siblings)

•Overweight or obese

•Habitual physical inactivity

•Race or ethnicity (Native American, Latino/Hispanic American, Asian American, African American, and Pacific Islanders)

•Prediabetes (i.e., previously identified with impaired glucose tolerance [IGT] or impaired fasting glucose [IFG])

•Hypertension (greater than or equal to 140/90 mm Hg)

•High-density lipoprotein (HDL) less than 35 mg/dL (0.91 mmol/L) and/or a triglyceride level greater than 250 mg/dL (2.83 mmol/L)

•History of gestational diabetes or delivery of a baby weighing greater than 4 kg (

•History of vascular disease

•History of polycystic ovary disease

CLINICAL STUDY

The pilot study on patients with Madhumegam (T_2 Diabetes mellitus) and satisfying the inclusion criteria was conducted at the OPD, Ayothidoss Pandithar Hospital, National Institute of Siddha, Tambaram sanatorium, Chennai-47.

Sample size:

20 patients.

SUBJECT SELECTION:

Inclusion Criteria:

- Age : 30-60 years
- Sex : Both Male and Female
- Patients having symptoms of,

  Dryness of mouth.

  Polyuria.

  Polyphagia

  Polydipsia

  Tiredness

  Recent change in weight

  Predilection for sweet foods

  (Any of the 4 or 5 clinical symptoms)

-Patient who are willing to provide blood sample for investigation.

-Patient willing to attend OPD on every 7^{th} day.

-Patient willing to sign the informed consent stating that he/she will conscientiously stick to the treatment during 30 days but can opt out of the trial of his/her own conscious dissertation.

Exclusion Criteria:

- Pregnancy and lactation
- Cardiac disease
- Renal disease
- Liver disease
- Known case of Hypo / hyper thyroidism
- Any other serious illness

Withdrawal Criteria:

- Development of adverse reaction
- Occurence of any other serious illness
- Non co-operation of the patients

TRIAL DRUG AND DURATION

Drug:

Kandha Chenduram-130mg with Ghee

Duration of the treatment:

30 days.

Conduct study:

Madhumegam (T_2 Diabetes mellitus) patients satisfying inclusion and exclusion criteria were attend to the trial. Informed consent was obtained from the patients. Routine investigations like Blood test, urine test, and PEFR were carried out before and after the trial treatment. For out patients the trial drug was issued for 7 days course. They were advised to visit the OPD once in 7 days. At each visit they were clinically assessed.

Clinical observation:

For the clinical study of "Kandha Chenduram" on Madhumegam (T_2 Diabetes mellitus), 20 patients were selected.

Among 20 patients, 10 (50 %) Patients were in Male, 10 (50%) Patients were in Female.

According to age wise distribution 15% Patients were in 30-40 years, 55% Patients were in 41-50 years and 30% Patients were in 51-60 years.

DISCUSSION

The principle aim of this study was to assess the pre-clinical safety and efficacy and to evaluate the therapeutic efficacy of the drug *Kandha chenduram* in the management of Madhumegam (T_2 Diabetes mellitus)

As per Siddha text in Madhumegam, kabam humors were deranged. Kaba thathu is responsible for the functioning of the Udal thathukal uniformly.

Hence administration of the trial drug *Kandha chenduram* was effective in the management of Madhumegam.

The trial drug was studied as per OECD guidelines.

Bio-chemical analysis of the trial drug was done and it shows the presence of Chloride, Iron, Calcium, Sodium and Amino acids

Toxicity Study

Based on these findings, toxic effect was observed at both 25 and 50mg/kg of Kandha Chenduram treated via oral route over a period of 28 days. So, it can be concluded that the Kandha Chenduram can be prescribed for therapeutic use in human with the strict dosage reductions of upto 12.5mg/kg. body weight p.o.

Pharmacological Study

Alloxan causes massive reduction in insulin release, through the destruction of β-cells of the islets of Langerhans. Kandha Chenduram did not show any effect on normal blood sugar levels but it effectively reversed the alloxan-induced changes in the blood sugar level and the β-cell population in the pancreas. This could be due to potentiation of the insulin effect of plasma by increasing the pancreatic secretion of insulin from existing β-cells of islets of Langerhans or its release from bound insulin. Diabetes mellitus is possibly the world's largest growing metabolic disease, and as the knowledge on the heterogeneity of this disorder is advanced, the need for more appropriate therapy increases. Traditional medicines like Kandha Chenduram can be used for a range of diabetic complications with lesser side effects.

Age

Among the 20 patient 55% of them were in the age group of 41-50. It reveals that mostly aged and middle age group peoples were affected.

Sex

All patients included were both Male and Female.

Gunam And Diet

All patients included in this study were having Thamo Gunam and they have non-vegetarian diet regularly.

Body Constitution

All patients were observed to have Thondha Udal type of body constitution.

Thinai

In this study 75% of the patients were from Neithal Thinai and remaining 25% of people were from Kurinji Thinai. People from Neithal Thinai have more chances to develop deranged Pitham humor.

Family History

Among 20 patients, 55% of the patients show positive family history.

Occupational History

Occupational history of the patients showing that

50% of them were businessman & salesman

35% of them were farmers

15% of others.

Socio-Economic Status

Among 20 patients, 55% of Patients middle class, 25% of Patients high class and 20% were from poor people.

Naadi

Among 20 patients, 60% were having vathapitha naadi, 30% were having pithavatha naadi and 10% were having vathakaba nadi.

Clinical Symptoms

Among 20 patients,

85% of patients relieved from polyurea,

65% of patients relieved from polyphagia,

75% of patients relieved from polydypsia,

70% of patients relieved from dryness of mouth.

75% of patients relieved from general tiredness, and no adverse effects were observed during trial period.

Investigations

Among 20 patients the serum enzyme markers

Blood sugar (Fasting) level was significantly reduced in 70% of patients

Blood sugar (Post prandial) level was significantly reduced in 60% of patients.

SUMMARY

- The literary evidence from the Siddha text, Kannusamy Parambarai Vaithyam strongly support the Hypoglycemic Activity of the drug.
- The drug Kandha chenduram was selected to evaluate the Hypoglycemic Activity in the management of Madhumegam (T_2 Diabetes mellitus).
- The biochemical analysis of the drug reveals the presence of Chloride, Iron, Calcium, Sodium and Amino acids
- The preclinical evaluation (acute & repeated oral toxicity study) of the drug was carried out as per OECD guideline in VELS University, Chennai. The result shows safety of the drug for human administration.
- The Preclinical Pharmacological study was carried out in animal model in VELS University, Chennai. The result shows that the drug has significant Hypoglycemic Activity of the drug.
- 85% of patients relieved from polyuria,
  65% of patients relieved from polyphagia,
  75% of patients relieved from polydypsia,
  70% of patients relieved from dryness of mouth.
  75% of patients relieved from general tiredness,
  and no adverse effects were observed during trial period.
- The drug Kandha chenduram has
  Hypoglycemic Activity &
  Encouraging clinical results.
- From the pharmacological study and clinical, it is proved that the drug Kandha Chenduram is clinically significant on Hypoglycemic Activity in the management of Madhumegam (T_2 Diabetes mellitus).

CONCLUSION

- The Siddha literature and review of the research journals of the drugs shows that it has Hypoglycemic Activity.
- The safety studies (acute and repeated oral toxicity) conducted revealed that the trial drug Kandha Chenduram was safe. There were no abnormalities found in blood investigation and histo-pathological examination. Hence it can be reasonably assumed that the drug is safe for human use.
- The pharmacological study conducted in animal model shows significant Hypoglycemic Activity.
- Clinical study revealed the therapeutic efficacy of the trial drug was improvement the clinical symptoms before and after treatment.
- Hence, the drug Kandha Chenduram can be used in the management of Madhumegam (T_2 Diabetes mellitus).

PRELIMINARY QUALITATIVE BIO-CHEMICAL TESTS RESULTS
(SARAKONRAIPOO CHOORANAM)

Table - 1

S.NO	CONSITUENTS	INFERENCE
1.	**Sulphate**	Absent
2.	**Chloride**	Absent
3.	**Phosphate**	Present
4.	**Carbonate**	Absent
5.	**Amino Acid**	Present
6.	**Sulphide**	Absent
7.	**Fluoride& Oxalate**	Absent
8.	**Borate**	Absent
9.	**Lead**	Absent
10.	**Copper**	Absent
11.	**Aluminium**	Absent
12	**Iron**	Present
13	**Zinc**	Absent
15	**Calcium**	Absent
16	**Magnesium**	Absent
17	**Ammonium**	Absent
18	**Mercury**	Absent
19	**Arsenic**	Absent
20	**Alkaloids**	Present
21	**Potassium**	Absent
22	**Sodium**	Present
23	**Starch**	Absent

PHYSICOCHEMICAL PROPERTIES

Table-2.

Colour characters of Sarakonraipoochooranam.

S No	Solvent used	Under ordinary light	Under ultra violet light
1	PPM	**Brownish Yellow**	**Brownish Yellow**

PPM-Powdered plant material

Table-3.

Physicochemical properties of Sarakonraipoochooranam.

S No.	Parameters	Values obtained (%w/w)	Heavy/ toxic metals	
1	Total ash value	9.87	Lead	BDL
2	Acid insoluble ash	0.7	Cadmium	BDL
3	Water soluble ash	9.8	Mercury	BDL
4	Moisture content	8.7	Arsenic	BDL
5	Foreign organic matter	5.2		
6	Crude fibre content	10.5		

SARAKONRAIPOO CHOORANAM -TLC/GC(PEAKS)

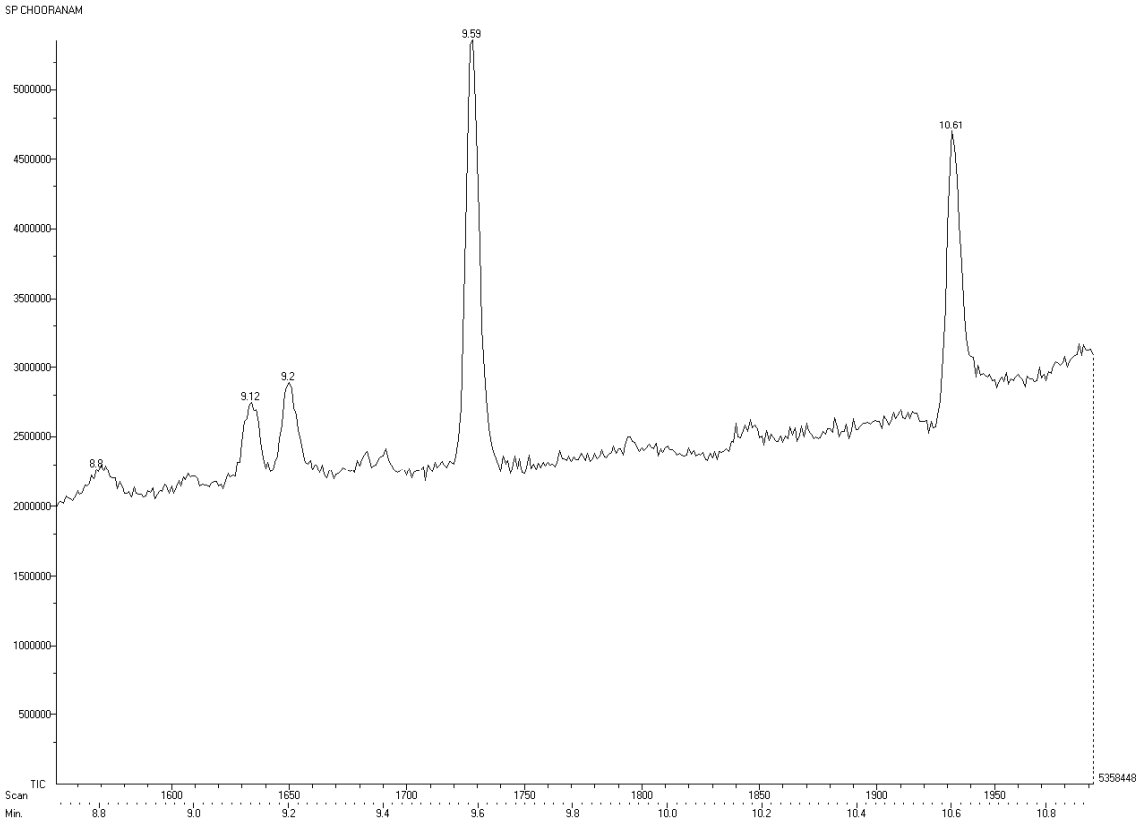


Table-4

Colour, nature and percent yields of extracts of SarakonraipooChooranam.

S.no	Extract Solvents	Colour	TLC/ GC (PEAKS)	Nature	% Yield(w/w)	Optical-Micro graph partical size range in micron	pH
1	Water	Brownish Yellow	5	Solid	52	80 - 100 micron	7.8 - 8.1

Table-5

PRELIMINARY PHYTOCHEMICAL ANALYSIS OF DIFFERENT EXTRACTS OF SARAKONRAIPOO CHOORANAM.

S.no	Phytoconstituents	Aqueous
1	Alkaloids	+
2	Flavonoids	+
3	Glycosides	+
4	Amino acids	+
5	Triterpenoids	+

+ = Present, – = Absent.

Table 6: Dose finding experiment and its behavioral Signs of Toxicity

No	Dose mg/kg	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1.	**1000**	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	**2000**	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	**5000**	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1. Alertness 2. Aggressiveness 3. Pile erection 4. Grooming 5. Gripping 6. Touch Response 7. Decreased Motor Activity 8.Tremors 9.Convulsions 10. Muscle Spasm 11. Catatonia 12. Muscle relaxant 13. Hypnosis 14.Analgesia 15.Lacrimation 16.Exophthalmos 17.Diarrhoea 18.Writhing 19.Respiration 20. Mortality

Table 7. Body wt (g) of rats exposed to *SarakonraiPoo Chooranam*for 28days.

Dose (mg/kg/day)	Days				
	1	**7**	**14**	**21**	**28**
Control	117.17±3.15	118.52±5.10	120.18±5.40	124.48±4.55	124.56±5.00
100	119.30±4.00	122.38±5.48	124.10±5.74	125.00±5.41	126.12±4.24
250	110.13±5.24	114.05±6.12	118.04±5.11	120.21±5.04	122.14±5.22
500	118.12±5.20	121.33±7.00	122.12±6.10	124.23±4.28	126.24±5.56

Values are mean ± S.E.M. (Dunnett's test). $^{ns}P>0.05$. N=6.

Table 8. Food (g/day) intake of rats exposed to *SarakonraiPoo Chooranam* for 28days.

Dose (mg/kg/day)	Days (gms/rats)				
	1	**7**	**14**	**21**	**28**
Control	44.56±2.33	42.25±2.52	42.10±2.46	44.10±2.56	45.19±2.11
100	45.12±2.24	44.48±2.54	45.45±2.20	45.14±2.42	44.15±3.00
250	40.23±2.68	42.45±2.42	44.42±2.64	45.31±2.12	45.41±3.13
500	41.12±2.46	42.55±2.45	45.22±2.76	45.24±2.55	45.20±2.97

Values are mean ± S.E.M. (Dunnett's test). ^{ns}P>0.05. N=6.

Table 9. Water (ml/day) intake of rats exposed to *SarakonraiPoo Chooranam* for 28days.

Dose (mg/kg/day)	Days(ml/rat)				
	1	**7**	**14**	**21**	**28**
Control	50.10±2.71	51.14±3.00	5.23±3.12**	50.22±3.12	51.44±3.77
100	51.10±2.34	52.10±3.02	53.14±4.00	56.10±3.01	54.52±2.90
250	52.04±2.25	50.12±3.54	51.28±3.10	54.12±2.80	52.44±3.22
500	50.10±3.00	52.54±3.11	50.46±3.17	49.26±3.44	50.00±3.21

Values are mean ± S.E.M. (Dunnet't' test). **P<0.05. N=6.

Table 10.Hematological parameters after 28days treatment with *SarakonraiPoo Chooranam* in rats.

Parameter	Control	100 mg/kg	250 mg/kg	500 mg/kg
Red blood cell (mm^3)	5.21±0.48	4.84±0.52	5.12±0.46	5.11±0.49
HB (%)	14.10±0.30	15.10±0.32	15.00±0.42	15.00±0.40
Leukocyte ($x10^3$/Cu.mm)	8.45±1.7	8.11±0.80	8.12±1.10	8.10±1.31
Platelets(K/µl)	447±22.1	491±30.41	498±30.11	497±30.42
MCV (gl)	52.74±5.00	50.17±4.33	52.02±4.12	53.14±4.17
N	14.45±1.22	15.47±1.10	14.81±0.82	14.47±3.10
L	82.33±2.24	81.66±3.11	81.45±3.44	82.64±3.21
M	1.48±0.30	1.24±0.34	1.31±0.20	1.74±0.27
E	1.01±0.00	1.04±0.28	1.00±0.15	1.00±0.10
B	0±0.00	0±0.00	0±0.00	0±0.00
ESR(mm)	1±00	1±00	1±00	1±00
PCV	44.22±2.44	45.47±2.33	45.15±2.12	45.66±3.55

Values are mean ± S.E.M. (Dunnet't' test). nsP>0.01. N=6.

Table 11.Effect of treatment with *SarakonraiPoo Chooranam* biochemical parameters.

Dose (mg/kg)	Control	100 mg/kg	250 mg/kg	500 mg/kg
Total Bilirubin (mg/dL)	0.27±0.04	0.28±0.05	0.29±0.06	0.28±0.05
Bilirubin direct (mg/dL)	0.22±0.06	0.22±0.07	0.18±0.04	0.20±0.04
ALP (U/L)	100.10±9.10	102.10±10.04	105.17±9.00	104.4±10.00
SGOT (U/L)	114.21±5.12	116.10±6.22	114.52±5.56	118.35±6.15
SGPT(U/L)	35.17±2.15	36.44±3.00	35.77±2.21	36.11±2.02
Total Protein(g/dl)	6.11±1.28	6.12±0.17	7.46±0.27	8.18±0.38
Albumin(g/dl)	2.64±0.22	2.66±0.22	3.40±0.20*	3.10±0.12
Globulin(g/dl)	4.10±0.14	5.00±0.18*	4.77±0.22	4.45±0.24

Values are mean ± S.E.M. *P<0.05vs Control N=6.

Table-12 RFT

Dose (mg/kg)	Control	100 mg/kg	250 mg/kg	500 mg/kg
Urea(mg/dL)	5.41±1.71	5.10±2.22	5.21±2.25	5.11±1.45
Creatinine (mg/dL)	0.71±0.06	0.72±0.05	0.71±0.05	0.70±0.04
Uric acid (mg/dL)	4.12±0.18	4.44±0.23	4.10±0.21	4.22±0.17
Nam.mol	115.44±5.00	112.7±4.48	110.34±4.10	117.18±4.00
Km.mol	5.10±2.47	5.10±1.10	5.20±1.45	5.18±2.10
Clm.mol	102.64±4.10	100.02±5.00	99.75±4.10	100.14±5.00

Values are mean ± S.E.M. ^{ns}P>0.05. Vs. *control group* N=6.

Table-13. Lipid Profile

Dose (mg/kg)	Control	100 mg/kg	250 mg/kg	500 mg/kg
Total cholestrol(mg/dL)	75.12±2.50	74.15±2.27	72.71±3.45	72.11±3.10
HDL(mg/dL)	115.28±2.74	117.25±2.64	119.10±3.21	120.12±2.32
LDL(mg/dL)	41.10±2.65	42.20±3.07	41.11±3.14	42.45±3.29
VLDL(mg/dl)	25.64±2.48	26.12±2.40	26.15±2.40	25.77±2.17
Triglycerides (mg/dl)	26.42±3.11	25.55±2.47	26.20±3.41	27.52±2.50
Bloodglucose(mg/dl)	88.77±4.45	90.12±4.24	91.10±5.14	92.44±2.44

Values are mean ± S.E.M. (Dunnet 't' test). ^{ns}P>0.01 Vs ControlN=6.

Table-14 Urine Analysis

Parameters	Control	100 mg/kg	250 mg/kg	500 mg/kg
Colour	Yellow	Yellow	Yellow	Yellow
Transparency	Clear	Slightly turbid	Slightly cloudy	Slightly turbid
Specific gravity	1.010	1.010	1.010	1.010
pH	>7.2	>8.0	>7.5	>7.5
Protein	Nil	1+	1+	2+
Glucose	Nil	Nil	Nil	Trace
Bilirubin	-ve	-ve	-ve	-ve
Ketones	-ve	-ve	-ve	-ve
Blood	Absent	Absent	Absent	Absent
Urobilinogen	Normal	Normal	Normal	Normal
Pus cells	0-cells/HPF	1-cell/HPF	2-cells/HPF	1-cell/HPF
RBCs	Nil	Nil	0-1cells/HPF	Nil
Epithelialcells	Nil	1-cell/HPF	Nil	1-cell/HPF
Crystals	Nil	Nil	Nil	Nil
Casts	Nil	Nil	Nil	Nil

Table 15. Effect of oral administration of *SarakonraiPoo Chooranam*on organ weight

Dose (mg/kg)	Control	100 mg/kg	250 mg/kg	500 mg/kg
Liver (g)	3.12±0.12	3.12±0.10	3.10±0.10	3.10±0.12
Heart (g)	0.34±0.05	0.35±0.07	0.34±0.06	0.36±0.03
Lung (g)	0.48±0.14	0.47±0.13	0.45±0.18	0.44±0.18
Spleen (g)	0.46±0.05	0.47±0.05	0.48±0.05	0.48±0.05
Ovary (g)	1.22±0.15	1.28±0.14	1.31±0.16	1.28±0.12
Testes (g)	2.15±0.18	2.22±0.20	2.24±0.20	2.31±0.15
Brain (g)	2.02±0.14	2.04±0.12	2.06±0.15	2.00±0.16
Kidney (g)	0.84±0.05	0.85±0.05	0.82±0.05	0.84±0.05
Stomach (g)	1.18±0.10	1.20±0.12	1.10±0.14	1.12±0.13

Values are mean ± S.E.M. (Dunnet 't' test). ^{ns}P>0.01 VsControlN=6.

Table 16.

Effect of Sarakonrai Poo Chooranam on CCl4-induced hepatoxicrats.

Group	SGOT (U/L)	SGPT (U/L)	ALP (mg/dl)	T. Bilirubin (mg/dl)	D.Bilirubin(mg/dl)
Group I	128.4±0.56^{b}	66.2±0.43^{b}	202.9±0.17^{b}	0.74±0.17^{b}	0.188±0.003^{b}
Group II	277.1±0.45**	169.5±0.45**	758.1±0.50**	8.11±0.24**	2.840±0.004**
Group III	220.6±1.15^{**,b}	156.1±0.60^{**,b}	634.8±0.47^{**,b}	5.22±0.51^{**,b}	0.565±0.002^{**,b}
Group IV	188.7±0.44^{**,b}	124.2±1.27^{**,b}	600.2±0.45^{**,b}	4.00±0.18^{**,b}	0.333±0.002^{**,b}
Group V	175.4±0.38^{**,b}	80.7±0.48^{**,b}	408.3±1.31^{**,b}	3.15±0.12^{**,b}	0.196±0.002^{b}

Values are as mean ± SEM (n=6)

Values are statistically significant at *P<0.05, **P<0.01, ***P<0.001; Comparison made between Group II VsGroup I P<0.001, ^{b}P<0.01,^{c}P<0.05 compared between Group III, IV, V Vs Group II

Table 16.

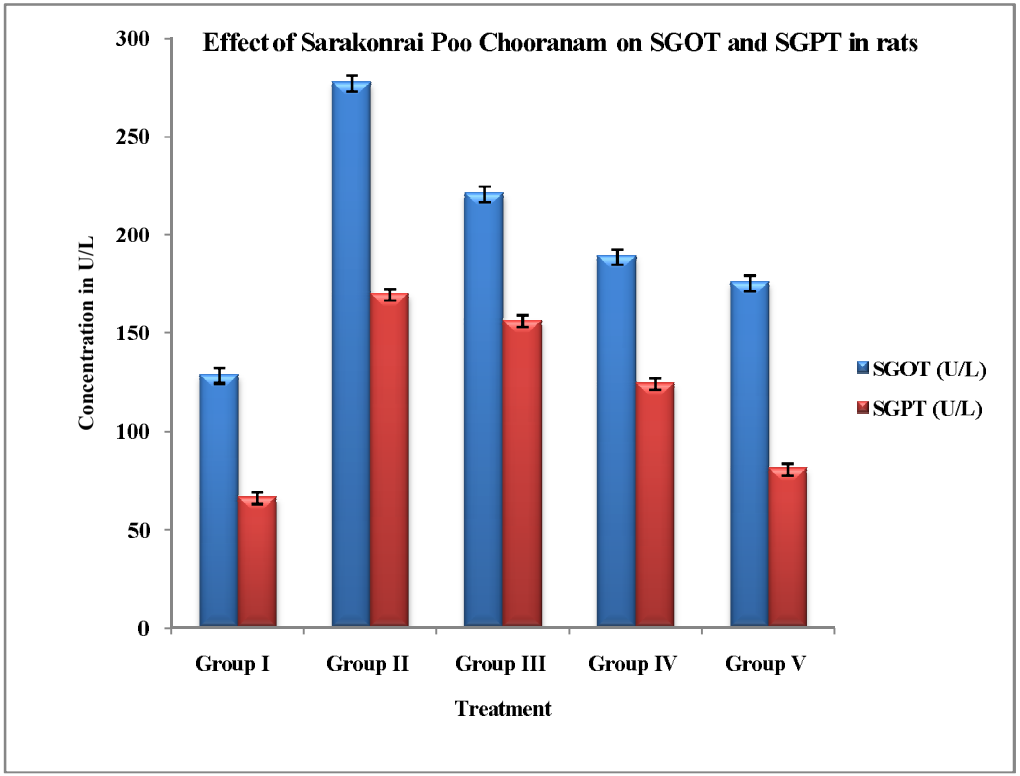
Effect of Sarakonrai Poo Chooranam on CCl4-induced hepatoxicrats.

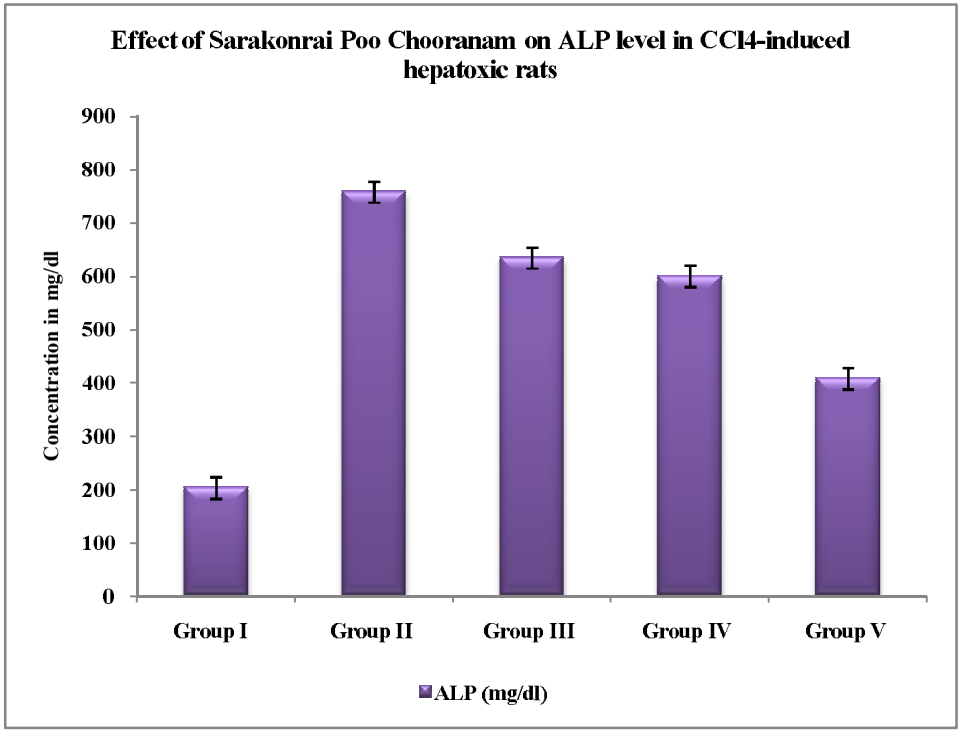
Group	SGOT (U/L)	SGPT (U/L)	ALP (mg/dl)	T. Bilirubin (mg/dl)	D.Bilirubin(mg/dl)
Group I	128.4±0.56^{b}	66.2±0.43^{b}	202.9±0.17^{b}	0.74±0.17^{b}	0.188±0.003^{b}
Group II	277.1±0.45**	169.5±0.45**	758.1±0.50**	8.11±0.24**	2.840±0.004**
Group III	220.6±1.15^{**,b}	156.1±0.60^{**,b}	634.8±0.47^{**,b}	5.22±0.51^{**,b}	0.565±0.002^{**,b}
Group IV	188.7±0.44^{**,b}	124.2±1.27^{**,b}	600.2±0.45^{**,b}	4.00±0.18^{**,b}	0.333±0.002^{**,b}
Group V	175.4±0.38^{**,b}	80.7±0.48^{**,b}	408.3±1.31^{**,b}	3.15±0.12^{**,b}	0.196±0.002^{b}

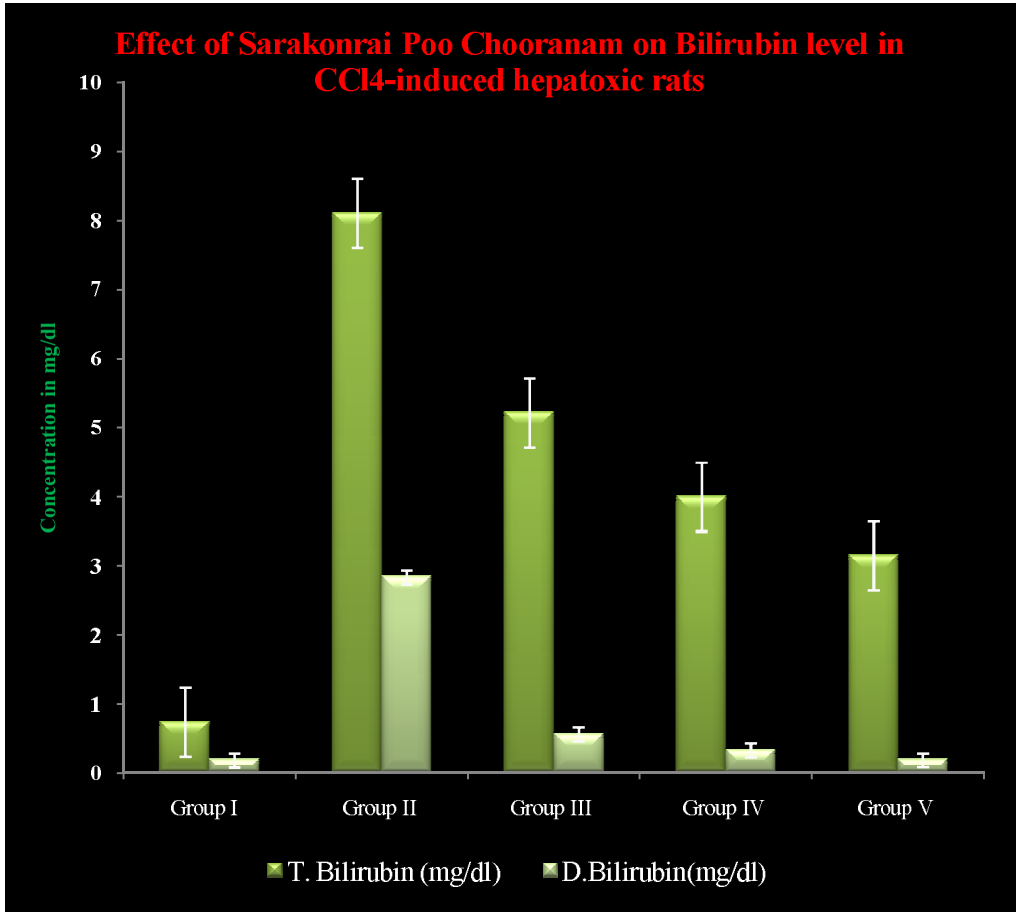
Values are as mean ± SEM (n=6)

Values are statistically significant at *P<0.05, **P<0.01, ***P<0.001; Comparison made between Group II VsGroup I

^{a}P<0.001, ^{b}P<0.01,^{c}P<0.05 compared between Group III, IV, V Vs Group II

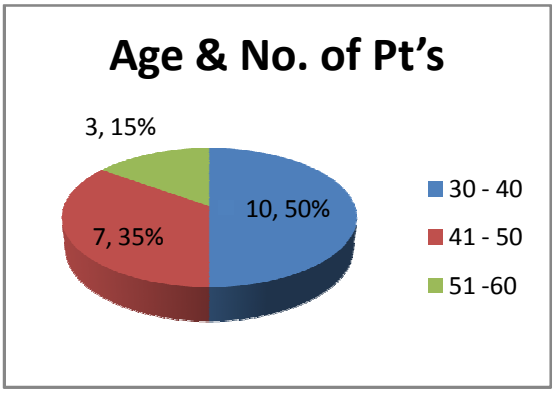

Effect of Sarakonrai Poo Chooranam on SGOT and SGPT in rats
300
250
200
150
100
50
0
Concentration in U/L
Group I
Group II
Group III
Group IV
Group V
Treatment
SGOT (U/L)
SGPT (U/L)


Effect of Sarakonrai Poo Chooranam on ALP level in CCl4-induced hepatoxic rats
Concentration in mg/dl
900
800
700
600
500
400
300
200
100
0
Group I
Group II
Group III
Group IV
Group V
ALP (mg/dl)


Effect of Sarakonrai Poo Chooranam on Bilirubin level in CCl4-induced hepatoxic rats
Concentration in mg/dl
10
9
8
7
6
5
4
3
2
1
0
Group I
Group II
Group III
Group IV
Group V
T. Bilirubin (mg/dl)
D.Bilirubin(mg/dl)

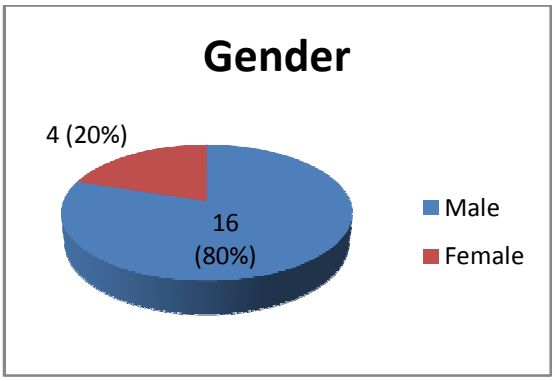
CLINICAL OBSERVATION

AGE DISTRIBUTION



Age	No. of pt's	%
30 - 40	10	50
41 - 50	7	35
51 -60	3	15

GENDER DISTRIBUTION



Sex	No. of Pt's	%
Male	16	80
Female	4	20

IMPROVEMENT SHOWING SIGNS AND SYMPTOMS BEFORE AND AFTER TREATMENT OF KAMALAI

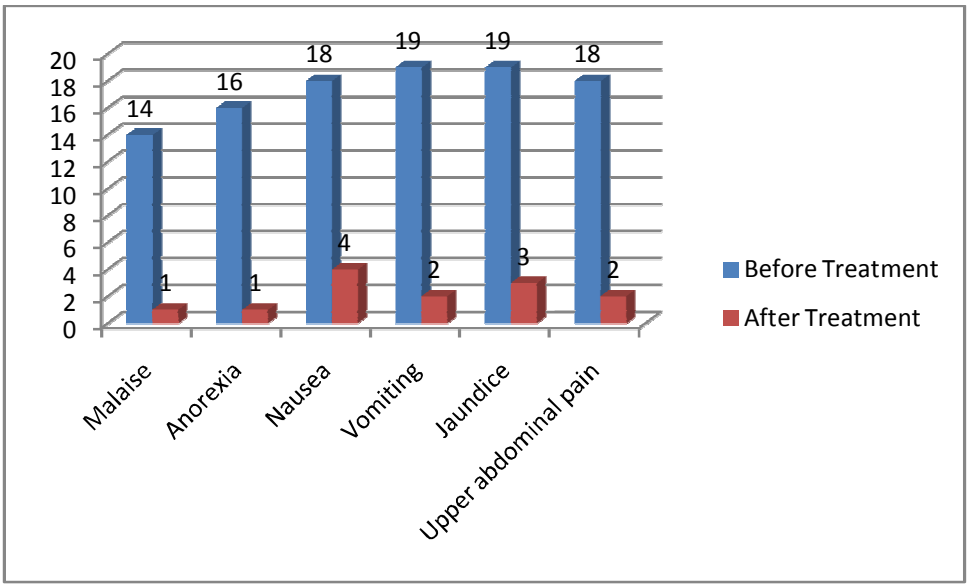


Table – 17

Symptoms	Before Treatment		After Treatment	
	No. of Pt's	Percentage %	No. of Pt's	Percentage %
Malaise	14	70	1	5
Anorexia	16	80	1	5
Nausea	18	90	4	20
Vomiting	19	95	2	10
Jaundice	19	95	3	15
Upper abdominal pain	18	90	2	10

Table – 18 Lab Investigation - Before Treatment (Kamalai)

S.NO	OP.NO	AGE	SEX	HB [gm/dl]	TC [cu.mm]	DC			TRBC [million/ cu.mm]	ESR [mm]		SUGAR [mg/dl]			UREA [mg/dl]	CREAT [mg/dl]	CHOLESTEROL [mg/dl]				
						P%	L%	E%		1/2Hr	1 HR	R	F	PP			TOTAL	HDL	LDL	VLDL	TGL
1	C 86735	35	M	11	8000	76	22	2	3.5	8	17		101	106	22	0.9	170	50	100	26	190
2	C 87508	36	M	10.8	5500	68	30	2	4	12	24	99	-	-	19	0.8	154	38	86	22	119
3	C 89166	34	M	10	7200	55	43	2	4.2	4	8	89	-	-	24	0.5	170	49	102	28	130
4	C 91482	49	M	12.3	7800	75	40	3	5.2	16	22	-	102	-	19	0.8	160	39	95	25	99
5	C 92861	60	M	10	10100	90	22	1	4.5	18	36		93		32	0.6	200	30	182	48	125
6	C 75221	50	F	11	8300	78	39	4	3.9	6	12	-	110	-	26	0.9	119	46	66	26	92
7	C 94582	32	M	9.8	11000	69	45	3	3.9	4	8	99	-	-	33	0.5	180	42	116	30	130
8	C 90420	48	M	8.3	4800	55	41	2	3.6	4	8	80	-	-	40	0.6	188	39	149	25	125
9	C 54568	35	M	9.9	6900	72	43	1	3.8	18	26	130	-	-	35	0.7	128	39	111	33	153
10	C 78596	55	F	11.4	4800	62	35	4	4.6	30	49	80	-	-	22	0.6	150	22	120	11	120
11	C 098098	40	M	10.6	7000	75	29	2	4.8	4	8	112	-	-	25	0.6	135	45	61	22	76
12	B 71819	36	M	12.6	8800	77	43	1	3.2	26	44	98	-	-	29	0.8	140	41	150	19	128
13	C 94857	52	F	11.4	7100	53	39	3	4	2	4	-	113	125	19	0.5	130	46	82	42	137
14	C 97797	44	M	14.3	8600	46	48	1	3	14	26	100	-	-	21	0.7	127	43	133	12	121
15	D 001844	43	M	12	7000	51	31	2	4.3	4	8	-	70	110	28	0.6	170	46	117	24	136
16	D 002125	42	M	12.6	6900	46	30	1	5.4	2	6	97	-	-	15	0.6	182	32	140	20	119
17	D 004644	38	M	13.4	5500	65	42	3	3.4	24	40	118	-	-	29	0.5	212	57	129	31	152
18	D 005757	48	M	11.9	7300	84	29	2	4.8	16	28	120	-	-	26	0.7	129	36	143	29	124
19	C 88174	40	F	8.9	7800	71	41	3	3.9	3	6	-	91	100	32	0.8	122	30	136	19	114
20	D 011548	38	M	9	7900	52	43	2	3.6	12	30	92	-	-	21	0.5	153	44	71	35	147

Table – 18 Lab Investigation - Before Treatment (Kamalai)

Table – 18 Lab Investigation - Before Treatment (Kamalai)

S.NO	OP.NO	BILIRUBIN [mg/dl]			SGOT [IU/L]	SGPT [IU/L]	ALKPHOS [IU/L]	PROTEIN [mg/dl]			CAL [mg/dl]	URIC ACID [mg/dl]	URINE					
		TOTAL	DIR	INDIR				TOTAL	ALB	GLOB			ALB	SUGAR	DEP	BS	BP	URO
1	C 86735	1.3	0.6	0.7	45	35	189	9	7.5	4.3	10.5	3.9	NIL	NIL	4-6PUS/4-6 EPI	NIL	NEG	NML
2	C 87508	1.5	0.6	0.9	51	45	290	8.2	6	4	9.5	3.1	NIL	NIL	1-2 PUS/2-4 EPI	PRESENT	POSITIVE	NML
3	C 89166	1	0.4	0.6	43	35	256	7.6	5.3	4.3	9.2	4.5	NIL	NIL	2-4PUS/3-6 EPI	NIL	NEG	NML
4	C 91482	1.5	0.6	0.9	47	38	210	7.8	6.2	3.2	9.3	3.3	NIL	NIL	2-4 PUS/8-10 EPI	PRESENT	POSITIVE	NML
5	C 92861	3	1.2	1.8	50	45	300	7.7	5.1	4.2	9.3	2.4	NIL	NIL	2-4 PUS/1-2 EPI	PRESENT	POSITIVE	NML
6	C 75221	1.2	0.5	0.7	38	36	252	8.2	5.2	3.9	10	2.9	NIL	NIL	2-4 PUS/2-4 EPI	NIL	NEG	NML
7	C 77685	0.9	0.4	0.5	28	32	225	7.4	6.2	3.8	10.9	2.5	NIL	NIL	2.4 PUS/1-2 EPI	NIL	NEG	NML
8	C 90420	1.3	0.6	0.7	23	28	125	6.9	4.6	4.5	9.2	3.8	NIL	NIL	0-1 PUS/0-1 EPI	PRESENT	POSITIVE	NML
9	C 54568	1.8	0.7	1.1	54	50	253	7.9	4.3	4.9	9.3	3.6	NIL	NIL	1-2 PUS/2-4 EPI	PRESENT	POSITIVE	NML
10	C 78596	2.5	0.9	1.6	35	28	295	8	5.9	4.5	10.5	3.6	NIL	NIL	1-2 PUS/1-2 EPI	PRESENT	POSITIVE	PRESENT
11	C 098098	1.3	0.5	0.8	43	30	131	7.8	4.8	5.8	10.9	4	NIL	NIL	1-2 PUS/2-4 EPI	NIL	NEG	NML
12	B 71819	2.9	1	1.9	72	53	215	7.3	4.7	3.2	9.6	2.7	NIL	NIL	2-4 P CELLS 2-4 E CELLS	PRESENT	POSITIVE	PRESENT
13	C 94857	1.1	0.7	0.4	48	38	252	8.1	5.3	4.8	9.6	3.9	NIL	NIL	1-2 PUS/1-3 EPI	NIL	NEG	NML
14	C 97797	1.6	0.6	1	32	28	198	7.4	4.5	3.9	9.3	4.7	NIL	NIL	2-4 PUS/1-2 EPI	PRESENT	POSITIVE	NML
15	D 001844	1.2	0.4	0.8	39	34	186	7.6	5.9	4.2	10.2	3.7	NIL	NIL	4-6 pus/4-6 EPI	NIL	NEG	NML
16	D 002125	0.9	0.6	0.4	49	66	269	7.5	4.8	5.1	7.6	6.1	NIL	NIL	PUSPLENTY 8-10 EPI	NIL	NEG	NML
17	D 004644	3.5	1.3	2.2	76	49	335	8.8	5.8	4.6	9.3	4.5	NIL	NIL	3-7 PUS/4-8 EPI	PRESENT	POSITIVE	PRESENT
18	D 005757	1.5	0.7	0.8	27	26	228	9.1	6.1	4.9	10.3	4.2	NIL	NIL	3-6 PUS/3-6 EPI	PRESENT	NEG	NML
19	C 88174	0.9	0.4	0.5	52	49	254	9.2	6.8	4.8	8.3	4.7	NIL	NIL	PLENTY PUS EPI PLENTY	NIL	NEG	NML
20	D 011548	1.4	0.7	0.7	38	38	299	8.1	5.8	5.2	9.6	3.8	NIL	NIL	2-4 PUS/2-4 EPI/	PRESENT	POSITIVE	NML

Table – 18 Lab Investigation - Before Treatment (Kamalai)

Table – 19 Lab Investigation – After Treatment (Kamalai Noi)

S.NO	OP.NO	AGE	SEX	HB [gm/dl]	TC [cu.mm]	DC			TRBC [million/ cu.mm]	ESR [mm]		SUGAR [mg/dl]			UREA [mg/dl]	CREAT [mg/dl]	CHOLESTEROL [mg/dl]				
						P%	L%	E%		1/2Hr	1 HR	R	F	PP			TOTAL	HDL	LDL	VLDL	TGL
1	C 86735	35	M	11.6	7700	78	20	2	3.7	4	8		106	116	18	0.6	180	55	105	20	185
2	C 87508	36	M	12.8	5900	64	34	2	4.2	2	4	94	-	-	16	0.6	140	35	85	20	110
3	C 89166	34	M	13.6	7600	59	40	1	4.7	14	28	90	-	-	21	0.6	160	42	98	20	135
4	C 91482	49	M	13.6	8400	64	32	4	5.6	6	12	-	90	-	16	0.6	160	42	99	19	95
5	C 92861	60	M	10.8	12000	80	19	1	3.6	18	36		90		24	0.7	225	29	152	44	220
6	C 75221	50	F	14	8000	72	25	3	4.4	6	12	-	86	-	17	0.6	112	41	54	17	86
7	C 94582	32	M	11.9	10500	68	30	2	4.1	4	8	103	-	-	20	0.6	175	45	106	24	120
8	C 90420	48	M	9.2	5800	58	39	3	3.1	4	8	73	-	-	35	0.8	266	85	158	23	115
9	C 54568	35	M	10.9	7800	65	33	2	4	8	16	103	-	-	27	0.7	110	35	55	20	193
10	C 78596	55	F	14.5	5300	60	34	6	4.8	2	4	83	-	-	17	0.7	181	32	140	9	140
11	C 098098	40	M	12.9	7700	70	26	4	4.1	4	8	90	-	-	30	0.8	115	36	67	12	62
12	B 71819	36	M	15.9	8700	68	31	1	5.2	2	4	101	-	-	25	0.7	160	36	110	14	148
13	C 94857	52	F	14.1	7200	57	40	3	4	2	4	-	96	125	17	0.6	150	36	92	22	117
14	C 97797	44	M	15.4	8300	56	42	2	3	2	4	89	-	-	16	0.6	160	35	115	10	105
15	D 001844	43	M	13.8	7200	63	25	2	3.2	4	8	-	68	100	22	0.7	189	42	124	23	116
16	D 002125	42	M	16.1	7400	56	40	4	5.1	2	6	97	-	-	16	0.5	174	36	100	40	129
17	D 004644	38	M	15.4	5900	60	36	4	5.2	4	10	92	-	-	15	0.5	199	56	119	24	122
18	D 005757	48	M	15.3	7800	70	27	3	5.4	4	8	119	-	-	21	0.6	200	40	133	27	138
19	C 88174	40	F	9.2	8600	60	36	4	3	32	64	-	82	96	30	0.8	212	30	156	26	134
20	D 011548	38	M	9.2	8800	65	33	02	3.1	30	60	85	-	-	17	0.6	127	31	69	27	137

Table – 19 Lab Investigation – After Treatment (Kamalai Noi)

S.NO	OP.NO	AGE	SEX	BILIRUBIN [mg/dl]			SGOT [IU/L]	SGPT [IU/L]	ALKPHOS [IU/L]	PROTEIN [mg/dl]			CAL [mg/dl]	URIC ACID [mg/dl]	URINE					
				TOTAL	DIR	INDIR				TOTAL	ALB	GLOB			ALB	SUGAR	DEP	BS	BP	URO
1	C 86735	35	M	0.6	0.4	0.2	35	32	165	8.5	5	3.5	10.5	3.9	NIL	NIL	4-6PUS/4-6 EPI	NIL	AT UBP	NML
2	C 87508	36	M	1.1	0.5	0.6	40	38	210	7.3	4.2	3.1	9.5	3.1	NIL	NIL	1-2 PUS/2-4 EPI	NIL	NEG	NEG
3	C 89166	34	M	0.7	0.4	0.3	38	21	190	7.1	4.5	3.6	9.2	4.5	NIL	NIL	2-4PUS/3-6 EPI	NIL	NEG	NML
4	C 91482	49	M	1	0.4	0.6	45	36	169	7.6	5.4	2.2	9.3	3.3	NIL	NIL	2-4 PUS/8-10 EPI	NIL	NEG	NML
5	C 92861	60	M	2.2	0.8	1.4	49	35	258	7.5	4.5	3	9.3	2.4	NIL	NIL	2-4 PUS/1-2 EPI	PRESENT	NEG	NML
6	C 75221	50	F	0.7	0.4	0.3	31	23	131	7.9	4.8	3.1	10	2.9	NIL	NIL	2-4 PUS/2-4 EPI	NIL	POSITIVE	NML
7	C 77685	32	M	0.5	0.3	0.2	24	23	210	7	5	2	10.9	2.5	NIL	NIL	2-4 PUS/1-2 EPI	NIL	NEG	NML
8	C 90420	48	M	0.9	0.3	0.6	19	20	112	6.5	3.5	3	9.2	3.8	NIL	NIL	0-1 PUS/0-1 EPI	NIL	NEG	NML
9	C 54568	35	M	1.6	0.6	1	50	40	241	7.5	3.9	3.6	9.3	3.6	NIL	NIL	1-2 PUS/2-4 EPI	NIL	NEG	NML
10	C 78596	55	F	2	0.7	1.3	29	23	209	7.6	4.1	3.5	10.5	3.6	NIL	NIL	1-2 PUS/1-2 EPI	+	NEG	PRESENT
11	C 098098	40	M	1	0.3	0.7	39	21	109	7.2	3.9	3.3	10.9	4	NIL	NIL	1-2 PUS/2-4 EPI	NIL	POSITIVE	NML
12	B 71819	36	M	2.6	0.9	1.7	64	45	189	6.7	3.9	2.8	9.6	2.7	NIL	NIL	2-4 P CELLS 2-4 E CELLS	+	NEG	PRESENT
13	C 94857	52	F	0.7	0.4	0.3	36	34	189	7.4	3.9	3.5	9.6	3.9	NIL	NIL	1-2 PUS/1-3 EPI	NIL	+	NML
14	C 97797	44	M	1.2	0.4.	0.8	22	24	153	6.9	3.3	3.6	9.3	4.7	NIL	NIL	2-4 PUS/1-2 EPI	NIL	NEG	NML
15	D 001844	43	M	0.8	0.3	0.5	25	27	158	6.9	4.1	2.8	10.2	3.7	NIL	NIL	4-6 pus/4-6 EPI	NIL	NEG	NML
16	D 002125	42	M	0.7	0.5	0.2	41	58	198	7.1	3.9	3.2	7.6	6.1	NIL	NIL	PUSPLENTY 8-10 EPI	NIL	NEG	NML
17	D 004644	38	M	3.2	1.2	2	66	47	298	8.2	4.4	3.8	9.3	4.5	NIL	NIL	3-7 PUS/4-8 EPI	PRESENT	NEG	PRESENT
18	D 005757	48	M	1	0.4	0.6	19	15	160	8.6	5.5	3.1	10.3	4.2	NIL	NIL	3-6 PUS/3-6 EPI	NIL	POSITIVE	NML
19	C 88174	40	F	0.5	0.3	0.2	40	40	168	8.8	4.5	4.3	8.3	4.7	NIL	NIL	PLENTY PUS EPI PLENTY	NIL	NEG	NML
20	D 011548	38	M	0.7	0.5	0.2	31	30	265	7.3	4.1	3.2	9.6	3.8	NIL	NIL	2-4 PUS/2-4 EPI/	NIL	NEG	NML

Table – 20 Specific Symptoms Before and After Treatment (Kamalai)

S.NO	OP NO	AGE	SEX	BT MAL	AT MAL	BT ANO	AT ANO	BT NAU	AT NAU	BT VOM	AT VOM	BT JAU	AT JAU	BT UABP	AT UABP	AT UABP
1	C 86735	35	M	+	-	+	-	+	-	+	-	+	-	+	-	-
2	C 87508	36	M	+	-	+	-	+	-	+	-	+	-	-	-	-
3	C 89166	34	M	+	-	+	-	+	-	+	-	+	+	+	-	-
4	C 91482	49	M	-	-	+	+	-	-	+	-	+	-	+	-	-
5	C 92861	60	M	+	-	+	-	+	-	+	-	+	+	+	-	-
6	C 75221	50	F	+	-	+	+	+	-	+	+	-	+	+	-	-
7	C 94582	32	M	+	-	+	-	+	+	+	-	+	-	+	-	-
8	C 90420	48	M	-	-	-	-	+	-	+	-	+	-	-	-	-
9	C 54568	35	M	-	-	+	-	+	-	+	-	+	-	+	-	-
10	C 78596	55	F	+	+	+	-	+	+	+	-	+	+	+	+	+
11	C 098098	40	M	+	+	+	+	+	-	+	-	+	+	+	-	-
12	B 71819	36	M	+	-	-	-	+	-	+	-	+	-	+	-	-
13	C 94857	52	F	+	-	+	-	+	-	+	-	+	-	+	+	+
14	C 97797	44	M	+	-	+	-	-	-	-	-	+	-	+	-	-
15	D 001844	43	M	-	-	+	-	+	-	+	-	+	-	+	-	-
16	D 002125	42	M	+	-	+	-	+	-	+	-	+	-	+	-	-
17	D 004644	38	M	-	-	-	-	+	-	+	-	+	-	+	-	-
18	D 005757	48	M	+	+	+	+	+	+	+	-	+	+	+	-	-
19	C 88174	40	F	+	-	+	-	+	-	+	-	+	-	+	-	-
20	D 011548	38	M	-	-	-	-	+	-	+	-	+	-	+	-	-

Table – 21 Specific Investigation – Before and After Treatment (Kamalai)

S. NO	OP NO	AGE	SEX	BT TB	AT TB	BT DB	AT DB	BT IB	AT IB	BT OT	AT OT	BT PT	AT PT	BT ALP	AT ALP
1	C 86735	35	M	1.3	0.6	0.6	0.4	0.7	0.2	45	35	35	32	189	165
2	C 87508	36	M	1.5	1.1	0.6	0.5	0.9	0.6	51	40	45	38	290	210
3	C 89166	34	M	1	0.7	0.4	0.4	0.6	0.3	43	38	35	21	256	190
4	C 91482	49	M	1.5	1	0.6	0.4	0.9	0.6	47	45	38	36	210	169
5	C 92861	60	M	3	2.2	1.2	0.8	1.8	1.4	50	49	45	35	300	258
6	C 75221	50	F	1.2	0.7	0.5	0.4	0.7	0.3	38	31	36	23	252	131
7	C 77685	32	M	0.9	0.5	0.4	0.3	0.5	0.2	28	24	32	23	225	210
8	C 90420	48	M	1.3	0.9	0.6	0.3	0.7	0.6	23	19	28	20	125	112
9	C 54568	35	M	1.8	1.6	0.7	0.6	1.1	1	54	50	50	40	253	241
10	C 78596	55	F	2.5	2	0.9	0.7	1.6	1.3	35	29	28	23	295	209
11	C 098098	40	M	1.3	1	0.5	0.3	0.8	0.7	43	39	30	21	131	109
12	B 71819	36	M	2.9	2.6	1	0.9	1.9	1.7	72	64	53	45	215	189
13	C 94857	52	F	1.1	0.7	0.7	0.4	0.4	0.3	48	36	38	34	252	189
14	C 97797	44	M	1.6	1.2	0.6	0.4.	1	0.8	32	22	28	24	198	153
15	D 001844	43	M	1.2	0.8	0.4	0.3	0.8	0.5	39	25	34	27	186	158
16	D 002125	42	M	0.9	0.7	0.6	0.5	0.4	0.2	49	41	66	58	269	198
17	D 004644	38	M	3.5	3.2	1.3	1.2	2.2	2	76	66	49	47	335	298
18	D 005757	48	M	1.5	1	0.7	0.4	0.8	0.6	27	19	26	15	228	160
19	C 88174	40	F	0.9	0.5	0.4	0.3	0.5	0.2	52	40	49	40	254	168
20	D 011548	38	M	1.4	0.7	0.7	0.5	0.7	0.2	38	31	38	30	299	265

TABLE - 22

PRELIMINARY QUALITATIVE BIO-CHEMICAL TESTS RESULTS FOR KANDHA CHENDURAM

S.NO	CONSITUENTS	INFERENCE
1.	**Calcium**	Present
2.	**Sulphate**	Absent
3.	**Chloride**	Present
4.	**Carbonate**	Absent
5.	**Sodium**	Present
6.	**Iron**	Present
7.	**Phosphate**	Absent
8.	**Tannic acid**	Absent
9.	**Sugars**	Absent
10.	**Tannins**	Absent
11.	**Alkaloids**	Present
12	**Fluoride**	Absent
13	**Oxalate**	Absent
15	**Zinc**	Absent
16	**Magnesium**	Absent
17	**Ammonium**	Absent
18	**Mercury**	Absent
19	**Arsenic**	Absent
20	**Silicate**	Present
21	**Lead**	Absent
22	**Copper**	Absent
23	**Starch**	absent

Physio – chemical properties

Table-23.

Colour characters of KandhaChenduram

.

S No	Solvent used	Under ordinary light	Under ultra violet light
1	PM	Brown	Brown

PM-Powdered material

Table-24.

Physicochemical properties of KandhaChenduram

S No.	Parameters	Values obtained (%w/w)	Heavy/ toxic metals	
1	Total ash value	9.75	Lead	BDL
2	Acid insoluble ash	0.75	Cadmium	BDL
3	Water soluble ash	8.4	Mercury	BDL
4	Moisture content	9.4	Arsenic	BDL
5	Loss on drying at 105°C	3.4		

Table-25.

Colour, nature and percent yields of extracts of KandhaChenduram

S.no.	Extract Solvents	Colour	Nature	% Yield(w/w)	Optical-Micro graph partical size range in micron	pH
1	Water	brown	Solid	46	30 - 50 micron	8.5 – 8.9

Table - 26

Sample ID	Analytical	Mean
Kandha Chenduram	As 193.696	BDL
	Ca 317.933	10.954 mg/L
	Cd 317.933	BDL
	Fe 238.204	75.632 mg/L
	Hg 253.652	BDL
	K 766.491	25.112 mg/L
	Mg 257.610	12.415 mg/L
	Na 588.995	17.245 mg/L
	P 214.914	15.247 mg/L
	Pb 230.204	BDL
	S 181.975	11.548 mg/L

BDL=Below detection limit

Table - 27 : Dose finding experiment and its behavioral Signs of Toxicity

No	Dose mg/kg	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	250	+	-	-	+	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	500	+	+	-	+	-	+	-	+	-	-	-	-	-	-	+	-	-	+	+	+
	1000	+	+	-	+	-	+	-	+	+	+	-	-	-	+	+	+	+	+	+	+
	2000	+	+	-	+	-	+	-	+	+	+	-	-	-	+	+	+	+	+	+	+

1. Alertness 2. Aggressiveness 3. Pile erection 4. Grooming 5. Gripping 6. Touch Response 7. Decreased Motor Activity 8.Tremors 9.Convulsions 10. Muscle Spasm 11. Catatonia 12. Muscle relaxant 13. Hypnosis 14.Analgesia 15.Lacrimation 16.Exophthalmos 17.Diarrhoea 18.Writhing 19.Respiration 20. Mortality

Table-28. Body wt (g) of rats exposed to *KandhaChendooram*for 28days.

Dose (mg/kg/day)	Days				
	1	**7**	**14**	**21**	**28**
Control	122.42±5.07	127.35±5.20	132.14±5.24	135.10±4.10	137.12±5.02
12.5	126.10±4.20	128.11±4.00	129.80±5.11	132.12±4.21	135.30±5.11
25	118.12±5.25	120.10±4.22	123.56±5.40	125.02±5.46	127.24±5.20
50	124.44±4.02	125.19±5.00	127.42±4.22	129.10±5.12	132.40±4.26

Values are mean ± S.E.M. (Dunnet 't' test). $^{ns}P>0.05$. N=6.

Table-29. Food intake of rats exposed to *KandhaChendooram* for 28days.

Dose (mg/kg/day)	Days (gms/rats)				
	1	**7**	**14**	**21**	**28**
Control	44.24±2.72	45.10±2.21	45.56±2.17	46.10±2.42	47.10±2.17
12.5	43.48±2.55	44.54±2.35	44.34±2.65	45.00±2.87	44.12±3.00
25	45.20±2.42	44.15±2.28	45.34±2.22	45.55±2.12	45.10±2.14
50	44.01±2.84	45.24±2.66	44.28±2.41	45.32±2.84	45.20±2.74

Values are mean ± S.E.M. (Dunnet 't' test). $^{ns}P>0.05$. N=6.

Table 30. Water intake of rats exposed to *KandhaChendooram* for 28days.

Dose (mg/kg/day)	Days(ml/rat)				
	1	**7**	**14**	**21**	**28**
Control	48.10±2.85	50.16±2.46	51.82±3.00	50.45±3.12	51.10±3.24
12.5	51.17±2.21	50.18±2.10	52.10±4.11	46.20±2.88	48.20±2.44
25	49.55±2.63	44.20±3.00	45.02±2.04	46.10±2.75	44.40±3.00
50	51.10±2.17	51.15±2.14	50.11±2.10	49.11±2.10	50.20±2.26

Values are mean ± S.E.M. (Dunnet 't' test). $^{ns}P>0.05$.. N=6.

Table 31.Hematological parameters after 28days treatment with *KandhaChendooram*.

Parameter	Control	12.5mg/kg	25mg/kg	50mg/kg
Red blood cell (mm^3)	5.12±0.47	5.22±0.41	5.10±0.42	5.36±0.40
HB (%)	15.12±0.30	15.18±0.28	14.44±0.46	15.15±0.42
Leukocyte ($x10^3$/Cu.mm)	8.15±1.4	8.52±0.75	8.12±1.02	8.32±1.46
Platelets(K/µl)	469±24.01	484±23.28	481±30.10	488±28.40
MCV (gl)	53.11±4.34	54.20±4.38	55.17±4.19	54.88±4.95
Neutrophil	15.24±1.19	15.22±1.10	15.75±0.82	15.12±3.00
Lymphocyte	82.12±2.36	81.88±2.96	82.41±3.00	84.31±3.11
Monocyte	1.48±0.30	1.51±0.32	1.39±0.30	1.42±0.28
Eosinophil	1.00±0.14	1.00±0.20	1.00±0.12	1.00±0.12
Basophil	0±0.00	1±0.00	0±0.00	1±0.00
ESR(mm)	1±00	1±00	1±00	1±00
PCV	46.12±2.75	45.56±2.33	45.10±3.82	45.45±3.10

Values are mean ± S.E.M. (Dunnet 't' test). **P<0.01. N=6.

Table 32. Effect of treatment with *KandhaChendooram* biochemical parameters

Dose (mg/kg)	Control	12.5mg/kg	25mg/kg	50mg/kg
Total Bilirubin (mg/dL)	0.31±0.06	0.34±0.05	0.30±0.05	0.29±0.04
Bilirubin direct (mg/dL)	0.21±0.05	0.21±0.06	0.20±0.05	0.22±0.05
ALP (U/L)	104.22±9.10	102.10±10.21	106.46±7.12	104.45±10.00
SGOT (U/L)	113.17±4.98	112.38±4.88	110.24±5.00	112.28±5.42
SGPT(U/L)	35.12±2.61	34.99±3.02	35.46±2.44	35.87±2.46
Total Protein(g/dl)	6.52±1.46	6.14±1.12	6.48±0.80	7.10±0.76
Albumin(g/dl)	2.17±0.24	2.10±0.28	3.42±0.20**	3.10±0.15*
Globulin(g/dl)	4.00±0.19	5.21±0.24**	4.20±0.21	4.48±0.24

Values are mean ± S.E.M. (Dunnet 't' test). $^{*}P<0.05$; $^{**}P<0.01$ V*s*ControlN=6.

Table-33 RFT

Dose (mg/kg)	Control	12.5mg/kg	25mg/kg	50mg/kg
Urea(mg/dL)	4.56±1.71	4.44±2.12	5.31±2.02	5.48±1.14
Creatinine (mg/dL)	0.72±0.04	0.71±0.05	0.72±0.05	0.70±0.04
Uric acid (mg/dL)	3.51±0.10	4.11±0.12**	4.10±0.12**	4.45±0.12**
Nam.mol	110.11±5.00	112.24±5.21	115.20±5.30	117.14±5.01
Km.mol	6.18±2.78	6.10±1.10	6.00±1.21	6.10±2.44
Clm.mol	102.44±4.61	104.52±5.14	108.24±4.64	105.66±5.00

Values are mean ± S.E.M. **P<0.05. Vs. Control N=6.

Table-34. Lipid Profile

Dose (mg/kg)	Control	12.5mg/kg	25mg/kg	50mg/kg
Total cholestrol(mg/dL)	72.46±2.44	72.17±2.40	74.22±3.46	72.00±2.88
HDL(mg/dL)	125.00±2.66	123.20±2.81	125.04±3.00	125.10±2.42
LDL(mg/dL)	41.28±2.95	41.44±2.61	42.17±2.98	42.00±3.00
VLDL(mg/dl)	25.97±2.10	25.56±2.38	26.12±2.41	27.14±2.20
Triglycerides (mg/dl)	26.10±3.21	26.10±2.22	26.64±2.00	25.02±2.97
Bloodglucose(mg/dl)	92.05±4.24	91.17±4.10	90.13±4.12	90.24±2.34

Values are mean ± S.E.M. (Dunnet 't' test). $^{ns}P>0.01$ V*s* ControlN=6.

Table-35 Urine Analysis

Parameters	Control	12.5mg/kg	25mg/kg	50mg/kg
Colour	Yellow	Yellow	Dark Brown	Reddish Yellow
Transparency	Clear	Slightly turbid	cloudy	turbid
Specific gravity	1.010	1.010	1.010	1.010
PH	>7.2	>8.0	>8.0	>8.0
Protein	Nil	1+	1+	2+
Glucose	Nil	Nil	Nil	Trace
Bilirubin	-ve	-ve	-ve	-ve
Ketones	-ve	-ve	-ve	-ve
Blood	Absent	Absent	Absent	Absent
Urobilinogen	Normal	Normal	Normal	Normal
Pus cells	0-cells/HPF	1-cell/HPF	2-cells/HPF	1-cell/HPF
RBCs	Nil	Nil	0-1cells/HPF	Nil
Epithelialcells	Nil	1-cell/HPF	Nil	1-cell/HPF
Crystals	Nil	Nil	Nil	Nil
Casts	Nil	Nil	Nil	Nil
Others	Bacteria seen	Bacteria seen	Bacteria seen	Bacteria seen

Table - 36. Effect of *KandhaChendooram*on organ weight

Dose (mg/kg)	Control	12.5mg/kg	25mg/kg	50mg/kg
Liver (g)	3.11±0.12	3.10±0.13	3.12±0.10	3.11±0.15
Heart (g)	0.31±0.04	0.30±0.03	0.34±0.04	0.32±0.03
Lung (g)	0.45±0.12	0.44±0.10	0.45±0.18	0.43±0.16
Spleen (g)	0.45±0.04	0.45±0.04	0.45±0.04	0.47±0.04
Ovary (g)	1.70±0.21	1.55±0.20	1.61±0.22	1.48±0.21
Testes (g)	2.14±0.12	2.44±0.20	2.41±0.21	2.55±0.20
Brain (g)	2.22±0.16	2.14±0.10	2.10±0.12	2.11±0.10
Kidney (g)	0.82±0.05	0.82±0.06	0.80±0.04	0.81±0.04
Stomach (g)	1.10±0.10	1.12±0.10	1.14±0.11	1.13±0.13

Values are mean ± S.E.M. (Dunnet 't' test). $^{ns}P>0.01$ V*s* ControlN=6.

Table-37.Oral glucose tolerance test

Treatment (dose / kg bodyweight)	Blood glucose (mg/dl)		
	Fasting	**30 min**	**90 min**
Normal	74.8 ± 2.2	78.5 ± 2.1	83.7 ± 2.0
Glucose; 2g.	72.0 ± 2.0	177.12 ± 1.5	234.20 ± 7.2
KC (25mg/kg)+Glucose	78.4 ± 2.0	91.26 ± 4.0**	82.15 ± 3.0**
KC-II (50mg/kg)+Glucose	74.0 ± 2.2	82.54 ± 2.10**	83.27 ± 2.8**
Glibenclamide(5mg/kg)	81.1 ± 3.0*	94.11 ± 5.19**	90.20 ± 6.4**

Values are as mean ± S.E.M**P <0.01; *P <0.05Vsgroup II; n=6

Table-38. Measurement of Body weight changes after KandhaChenduram treatment

Drug treatment	Periodical Weight changes					
	Day0	**Day1**	**Day2**	**Day4**	**Day8**	**Day14**
Normal	228.4 ± 8.16	232.2 ± 9.0	235.6 ± 7.0	240.1 ± 7.8	244.6 ± 8.1b	252.2 ± 7.2b
Diabetic control	232.0 ± 10.12	235.8 ± 8.1	222.3 ± 7.2	206.4 ± 6.2	200.8 ± 5.0**	196.5 ± 8.4**
KC -I 25mg/kg	230.0 ± 11.55	234.3 ± 9.8	230.2 ± 10.5	233.8 ± 12.2	235.6 ± 7.5c	235.7 ± 10.5c
KC -II 50mg/kg	231.1 ± 8.45	235.2 ± 9.4	230.7 ± 7.4	232.4 ± 10.1	234.5 ± 8.3c	235.1 ± 7.5c
Glibenclamide(5mg/kg)	225.9 ± 10.20	229.4 ± 11.6	233.5 ± 12.1	235.3 ± 10.4	238.5 ± 10.2b	240.5 ± 10.6b

Values are as mean ± S.E.M[a]P<0.001; [b]P<0.05 Vs Normal, **P <0.01; *P <0.05Vs Diabetic Control; n=6

Table: 39. Fasting serum Glucose concentration is normal and Alloxon-induced diabetic rats

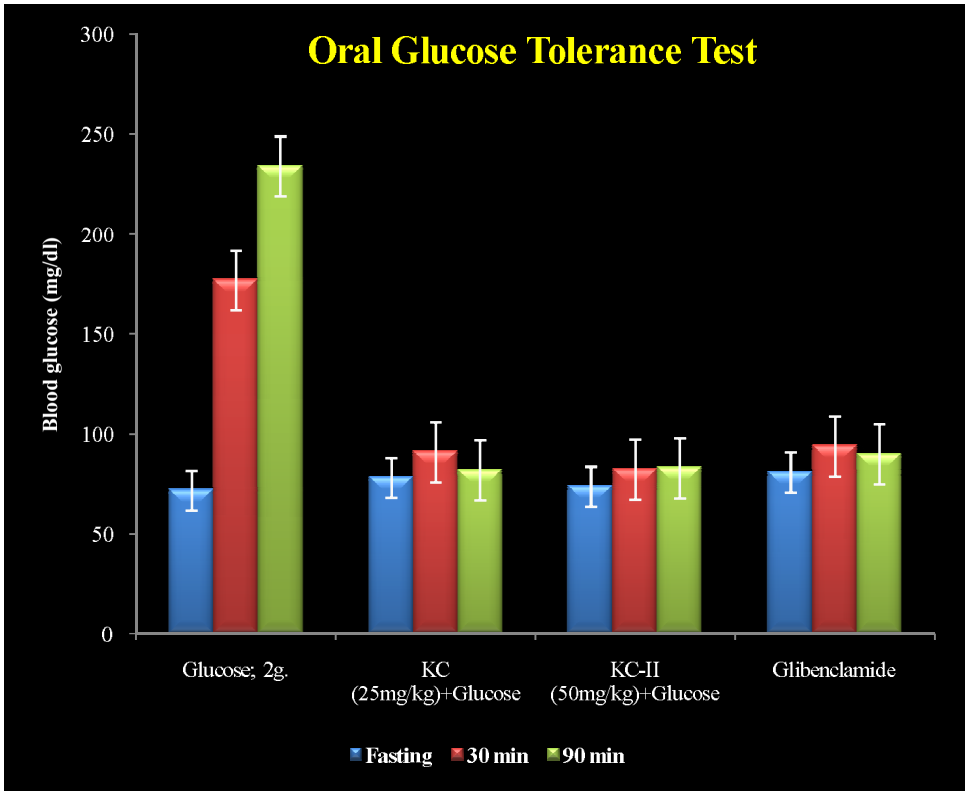
Treatment	Fasting serum Glucose concentration (mg/dl) measured at regular intervals			
	Day 1	**Day 5**	**Day 10**	**Day 14**
Normal	74.64 ± 2.40b	71.36 ± 3.00b	74.34 ± 5.14b	78.13 ± 3.12b
Diabetic control	225.17±16.64**	257.10 ± 12.2**	283.10 ±10.10**	312.10± 4.62**
KC -I 25mg/kg	221.05 ± 3.09**	186.20 ± 10.15**,b	124.28 ± 5.67**,b	109.17± 2.48**,b
KC -II 50mg/kg	230.15 ± 2.69**	162.45 ± 12.00**,b	112.10 ± 5.53**,b	102.56 ±2.33**,b
Glibenclamide(5mg/kg)	251.96 ± 2.65**	120.10±3.12**,b	98.5 ± 3.11**,b	101.12 ± 4.12**,b

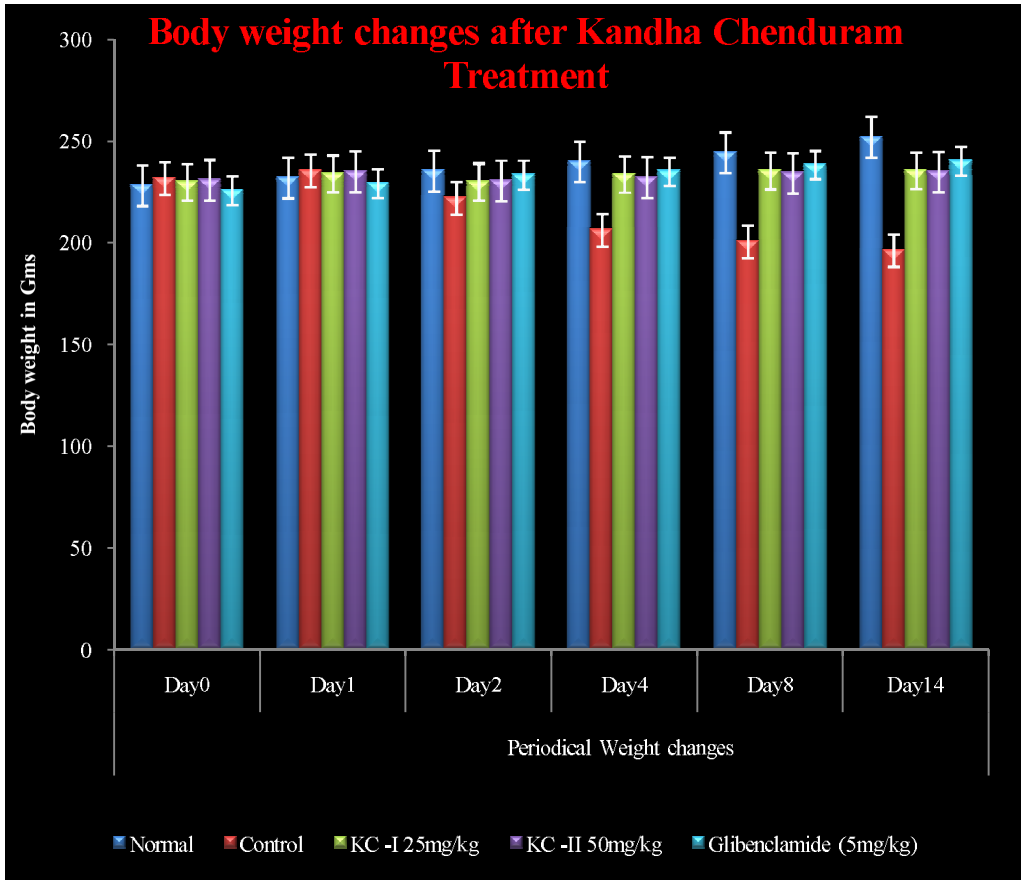
Values are as mean ± S.E.M[a]P<0.001; [b]P<0.05 Vs Normal, **P <0.01; *P <0.05Vs Diabetic Control; n=6

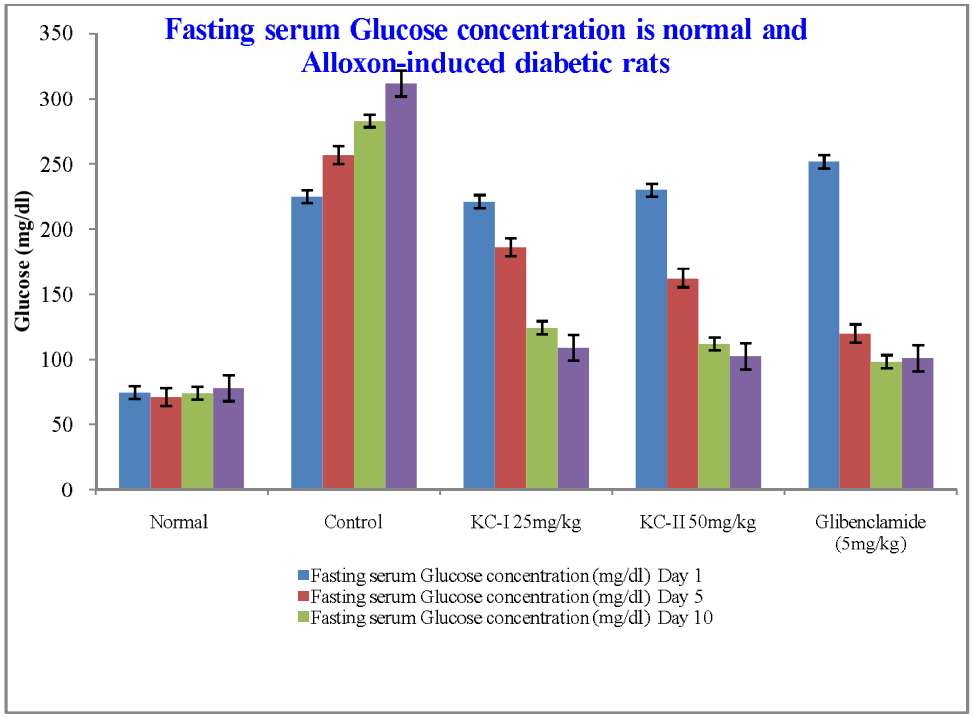
Table: 40. Lipid profile in normal and effect of KandhaChenduram in Alloxon-induced diabetic rats.

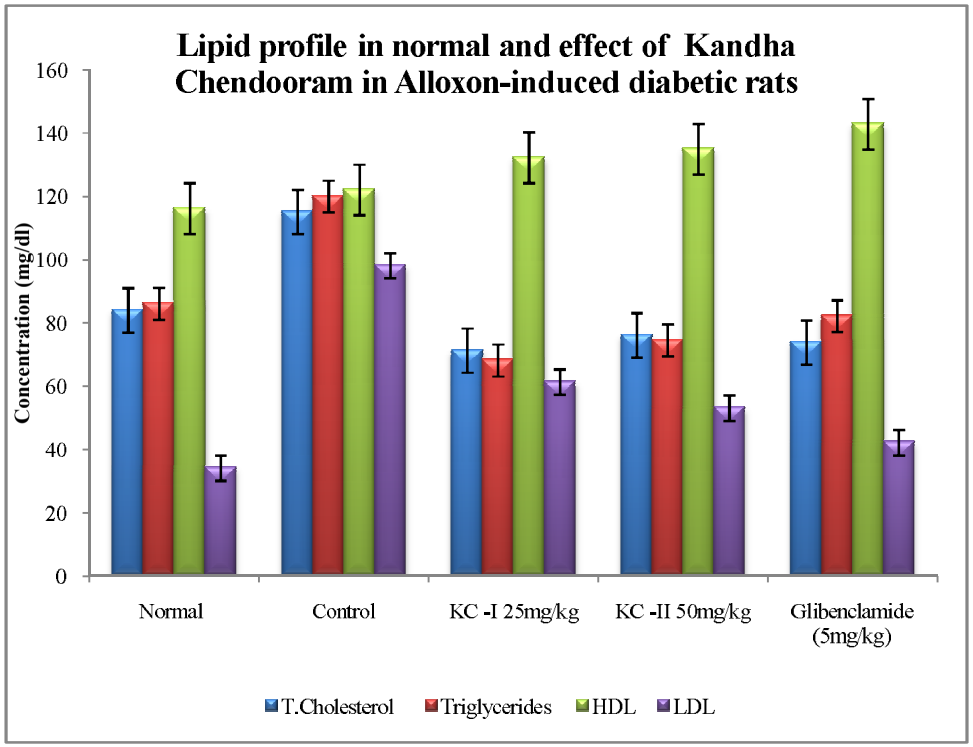
Treatment	Dose	Parameters (mg/dl)			
		Total Cholesterol	Triglycerides	HDL	LDL
Normal control	10mg/kg of vehicle	84.14 ± 1.2b	86.2 ± 2.96b	116.2±0.42b	34.26±2.66*
Diabetic control	-	115.2 ± 3.0**	120.1 ± 4.24**	122.1±0.36**	98.20±1.60**
KC -I	(25mg/kg)	71.28 ± 1.5**,b	68.2 ± 2.17**,b	132.30±0.41**,b	61.46±2.25**,b
KC -II	(50mg/kg)	76.12 ± 1.6*,b	74.6 ± 2.35*,b	135.1±0.30**,b	53.22±0.62**,b
Glibenclamide	(5mg/kg)	74.0 ± 1.4**,b	82.3 ± 3.22b	142.9±1.12**,b	42.31±0.52*,b

Values are as mean ±S.E.M; [a]P<0.001; [b]P<0.01; [c]P<0.05 Vs Normal; [d]P<0.001 Vs Diabetic; n=6

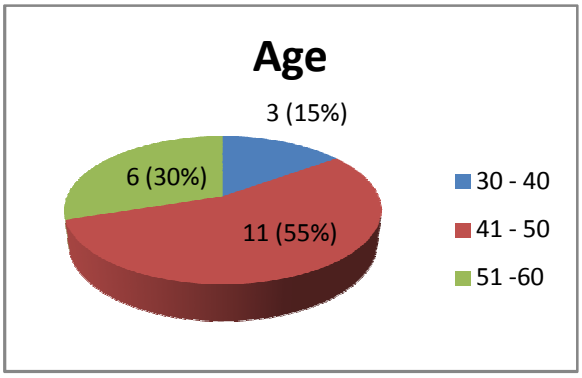

Oral Glucose Tolerance Test
Blood glucose (mg/dl)
300
250
200
150
100
50
0
Glucose; 2g.
KC (25mg/kg)+Glucose
KC-II (50mg/kg)+Glucose
Glibenclamide
Fasting
30 min
90 min


Body weight changes after Kandha Chenduram Treatment
300
250
200
150
100
50
0
Body weight in Gms
Day0
Day1
Day2
Day4
Day8
Day14
Periodical Weight changes
Normal
Control
KC -I 25mg/kg
KC -II 50mg/kg
Glibenclamide (5mg/kg)

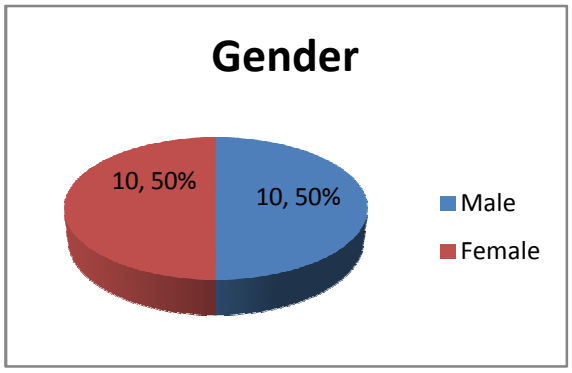

Fasting serum Glucose concentration is normal and Alloxon-induced diabetic rats
Glucose (mg/dl)
350
300
250
200
150
100
50
0
Normal
Control
KC-I 25mg/kg
KC-II 50mg/kg
Glibenclamide (5mg/kg)
Fasting serum Glucose concentration (mg/dl) Day 1
Fasting serum Glucose concentration (mg/dl) Day 5
Fasting serum Glucose concentration (mg/dl) Day 10


Lipid profile in normal and effect of Kandha Chendooram in Alloxon-induced diabetic rats
Concentration (mg/dl)
160
140
120
100
80
60
40
20
0
Normal
Control
KC -I 25mg/kg
KC -II 50mg/kg
Glibenclamide (5mg/kg)
T.Cholesterol
Triglycerides
HDL
LDL

CLINICAL ASSESSMENT FOR KANDHA CHENDURAM



Age	No. of patients	Percentage %
30 - 40	3	15
41 - 50	11	55
51 -60	6	30



Sex	No. of patients	Percentage %
Male	10	50
Female	10	50

IMPROVEMENT SHOWING SIGNS AND SYMPTOMS BEFORE AND AFTER TREATMENT OF MADHUMEGAM

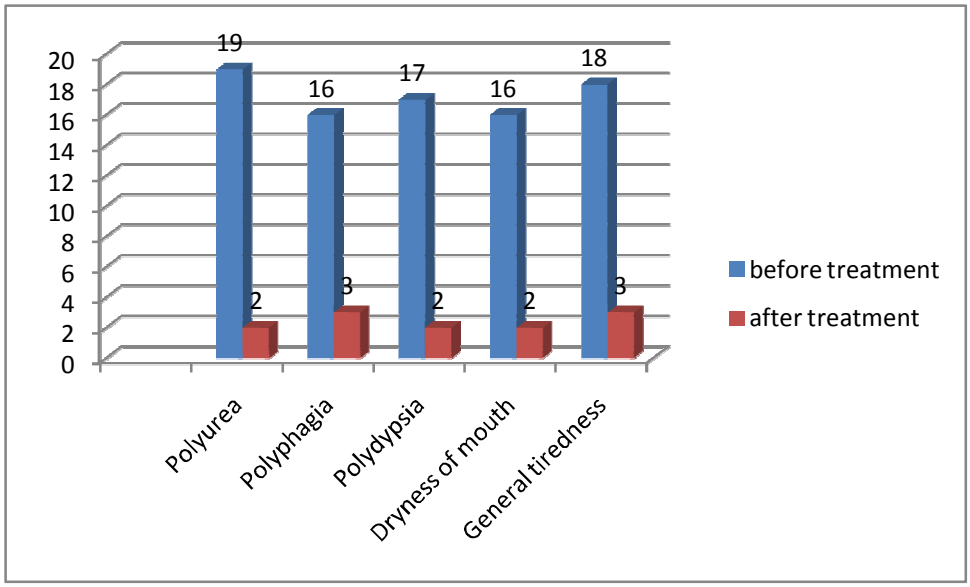


Table - 41

Symptoms	Before Treatment		After Treatment	
	Pt's	Percentage %	Pt's	Percentage %
Polyurea	19	95	2	10
Polyphagia	16	80	3	15
Polydypsia	17	85	2	10
Dryness of mouth	16	80	2	10
General tiredness	18	90	3	15

Table – 42 Lab Investigation - Before Treatment (Madhumegam)

S.NO	OP.NO	Age	Sex	HB [gm/dl]	TC [cu.mm]	DC			TRBC million/ cu.mm	ESR [mm]		Bl. sugar		UREA mg/dl	CREA mg/dl	CHOLESTEROL [mg/dl]				
						P%	L%	E%		1/2Hr	1 HR	F	PP			TOTAL	HDL	LDL	VLDL	TGL
1	C 66119	48	M	11	8000	76	22	2	3.5	8	17	129	246	22	0.9	170	50	100	26	190
2	C 91352	45	M	10.8	5500	68	30	2	4	12	24	145	210	19	0.8	154	38	86	22	119
3	B 60881	50	M	10	7200	55	43	2	4.2	4	8	163	212	24	0.5	170	49	102	28	130
4	C 88561	40	M	12.3	7800	75	40	3	5.2	16	22	133	254	19	0.8	160	39	95	25	99
5	A 61840	40	M	10	10100	90	22	1	4.5	18	36	178	270	32	0.6	200	30	182	48	125
6	C 94199	30	M	11	8300	78	39	4	3.9	6	12	138	296	26	0.9	119	46	66	26	92
7	C 94582	54	M	9.8	11000	69	45	3	3.9	4	8	180	256	33	0.5	180	42	116	30	130
8	A 0656	54	F	8.3	4800	55	41	2	3.6	4	8	134	206	40	0.6	188	39	149	25	125
9	C 24343	50	F	9.9	6900	72	43	1	3.8	18	26	134	239	35	0.7	128	39	111	33	153
10	C 51579	45	M	11.4	4800	62	35	4	4.6	30	49	171	210	22	0.6	150	22	120	11	120
11	C 67426	44	F	10.6	7000	75	29	2	4.8	4	8	160	180	25	0.6	135	45	61	22	76
12	C 81771	42	M	12.6	8800	77	43	1	3.2	26	44	139	194	29	0.8	140	41	150	19	128
13	B 75936	52	F	11.4	7100	53	39	3	4	2	4	141	187	19	0.5	130	46	82	42	137
14	C 099559	52	F	14.3	8600	46	48	1	3	14	26	133	246	21	0.7	127	43	133	12	121
15	C 43630	54	F	12	7000	51	31	2	4.3	4	8	208	270	28	0.6	170	46	117	24	136
16	C 98004	50	F	12.6	6900	46	30	1	5.4	2	6	180	206	15	0.6	182	32	140	20	119
17	D 000809	45	F	13.4	5500	65	42	3	3.4	24	40	168	226	29	0.5	212	57	129	31	152
18	C 26069	54	F	11.9	7300	84	29	2	4.8	16	28	126	218	26	0.7	129	36	143	29	124
19	A 24318	46	M	8.9	7800	71	41	3	3.9	3	6	174	301	32	0.8	122	30	136	19	114
20	C 57149	50	F	9	7900	52	43	2	3.6	12	30	150	233	21	0.5	153	44	71	35	147

Table – 42 Lab Investigation - Before Treatment (Madhumegam)

Table – 42 Lab Investigation - Before Treatment (Madhumegam)

S.NO	OP.NO	Age	Sex	BILIRUBIN [mg/dl]			SGOT [IU/L]	SGPT [IU/L]	ALKPHOS [IU/L]	PROTEIN [mg/dl]			CAL [mg/dl]	URIC ACID [mg/dl]	urine			
				TOTAL	DIR	INDIR				TOTAL	ALB	GLOB			ALB	Sugar F	Sugar PP	DEP
1	C 66119	48	M	0.7	0.4	0.3	79	82	182	7.1	4.0	3.1	10.5	4.5	NIL	+	++	4-6PUS/4-6 EPI
2	C 91352	45	M	1.3	0.8	0.3	268	143	377	6.4	4.6	1.8	9.5	3.1	NIL	+	++	2-4 PUS/2-4 EPI
3	B 60881	50	M	0.5	0.3	0.2	58	46	245	6.9	3.9	3	9.5	4.5	NIL	+	++	2-4PUS/3-6 EPI
4	C 88561	40	M	0.7	0.5	0.2	54	57	169	7.8	4.4	3.4	9.3	-	NIL	+	++	4-5 PUS/2-4 EPI
5	A 61840	40	M	0.6	0.3	0.3	85	78	267	7.5	4.5	3	9.3	2.4	NIL	+	++	2-4 PUS/1-2 EPI
6	C 94199	30	M	0.4	0.3	0.1	79	80	231	6.9	4.2	2.7	10.3	3.9	NIL	+	+++	3-5PUS/4-6 EPI
7	C 94582	54	M	1.6	0.9	0.7	52	23	298	7	3.7	3.3	10.9	2.5	NIL	++	++	3-6 PUS/3-6 EPI
8	A 0656	54	F	0.6	0.3	0.3	52	67	114	6.9	4.1	2.8	10.5	4.5	NIL	+	++	2-4 PUS/2-4EPI
9	C 24343	50	F	0.8	0.5	0.3	64	58	225	6.4	5.4	1	10.5	3.8	NIL	+	++	2-4 PUS/2-4EPI
10	C 51579	45	M	0.6	0.3	0.3	113	189	199	6.8	3	3.8	9.7	5.8	NIL	+	++	1-2 PUS/1-2 EPI
11	C 67426	44	F	0.5	0.3	0.2	80	97	105	6.6	4.5	2.1	5.6	5.6	NIL	+	+	2-4PUS/3-6 EPI
12	C 81771	42	M	0.5	0.3	0.2	30	130	203	7.1	5.3	1.8	9.6	5.2	NIL	+	+	1-2 PUS/1-2 EPI
13	B 75936	52	F	0.6	0.3	0.3	134	89	216	7.4	4.2	3.2	9.6	3.7	NIL	+	+	1-2 PUS/1-2 EPI
14	C 099559	52	F	0.8	0.5	0.3	123	140	156	6	3.7	2.3	9.3	3.9	NIL	+	+	2-4 PUS/1-2 EPI
15	C 43630	54	F	0.9	0.5	0.4	169	184	266	7.2	3.7	3.5	9.6	6.7	NIL	++	+++	1-2 PUS/1-2 EPI
16	C 98004	50	F	0.9	0.5	0.4	173	150	224	7.9	4	3.9	9.8	4.1	NIL	+	++	1-2 PUS/1-2 EPI
17	D 000809	45	F	0.9	0.5	0.4	35	135	149	186	7.3	5	2.3	4.5	NIL	+	++	5-6 PUS/3-5EPI
18	C 26069	54	F	0.6	0.4	0.2	19	15	160	8.6	5.5	3.1	10.3	4.2	NIL	+	++	3-6 PUS/3-6 EPI
19	A 24318	46	M	0.9	0.5	0.4	235	180	237	8.1	5	3.1	8.3	4.7	NIL	+	+++	10-12 PUS/6-7 EPI
20	C 57149	50	F	0.5	0.3	0.2	44	70	188	7.1	4.3	2.8	9.6	3.8	NIL	+	++	4-5 PUS/4-5 EPI/

Table – 42 Lab Investigation - Before Treatment (Madhumegam)

Table – 43 Lab Investigations- After treatment (Madhumegam)

S.NO	OP.NO	Age	Sex	HB [gm/dl]	TC [cu.mm]	DC			TRBC [million/ cu.mm]	ESR [mm]		SUGAR [mg/dl]		UREA [mg/dl]	CREAT [mg/dl]	CHOLESTEROL [mg/dl]				
						P%	L%	E%		1/2Hr	1 HR	F	PP			TOTAL	HDL	LDL	VLDL	TGL
1	C 66119	48	M	11.6	7700	78	20	2	3.7	4	8	92	134	18	0.6	180	55	105	20	185
2	C 91352	45	M	12.8	5900	64	34	2	4.2	2	4	105	127	16	0.6	140	35	85	20	110
3	B 60881	50	M	13.6	7600	59	40	1	4.7	14	28	133	143	21	0.6	160	42	98	20	135
4	C 88561	40	M	13.6	8400	64	32	4	5.6	6	12	104	133	16	0.6	160	42	99	19	95
5	A 61840	40	M	14	8000	72	25	3	4.4	6	12	110	149	17	0.6	112	41	54	17	86
6	C 94199	30	M	11.9	10500	68	30	2	4.1	4	8	95	189	20	0.6	175	45	106	24	120
7	C 94582	54	M	10.9	7800	65	33	2	4	8	16	145	183	27	0.7	110	35	55	20	193
8	A 0656	54	F	14.5	5300	60	34	6	4.8	2	4	113	154	17	0.7	181	32	140	9	140
9	C 24343	50	F	12.9	7700	70	26	4	4.1	4	8	128	145	30	0.8	115	36	67	12	62
10	C 51579	45	M	15.9	8700	68	31	1	5.2	2	4	116	138	25	0.7	160	36	110	14	148
11	C 67426	44	F	14.1	7200	57	40	3	4	2	4	91	126	17	0.6	150	36	92	22	117
12	C 81771	42	M	15.4	8300	56	42	2	3	2	4	131	201	16	0.6	160	35	115	10	105
13	B 75936	52	F	13.8	7200	63	25	2	3.2	4	8	101	136	22	0.7	189	42	124	23	116
14	C 099559	52	F	16.1	7400	56	40	4	5.1	2	6	98	140	16	0.5	174	36	100	40	129
15	C 43630	54	F	15.4	5900	60	36	4	5.2	4	10	179	203	15	0.5	199	56	119	24	122
16	C 098004	50	F	15.3	7800	70	27	3	5.4	4	8	101	119	21	0.6	200	40	133	27	138
17	D 000809	45	F	9.2	8600	60	36	4	3	32	64	110	135	30	0.8	212	30	156	26	134
18	C 26069	54	F	9.2	8800	65	33	02	3.1	30	60	89	128	17	0.6	127	31	69	27	137
19	A 24318	46	M	10.8	12000	80	19	1	3.6	18	36	141	207	24	0.7	225	29	152	44	220
20	C 57149	50	F	9.2	5800	58	39	3	3.1	4	8	114	146	35	0.8	266	85	158	23	115

Table – 43 Lab Investigations- After treatment (Madhumegam)

Table – 43 Lab Investigations- After treatment (Madhumegam)

S.NO	OP.NO	Age	sex	BILIRUBIN [mg/dl]			SGOT [IU/L]	SGPT [IU/L]	ALKPHOS [IU/L]	PROTEIN [mg/dl]			CAL [mg/dl]	URIC ACID [mg/dl]	URINE			
				TOTAL	DIR	INDIR				TOTAL	ALB	GLOB			ALB	Sugar f	Sugar p	DEP
1	C 66119	48	M	0.6	0.4	0.2	35	32	165	8.5	5	3.5	10.5	3.9	NIL	-	-	4-6PUS/4-6 EPI
2	C 91352	45	M	0.8	0.5	0.3	40	38	210	7.3	4.2	3.1	9.5	3.1	NIL	-	-	1-2 PUS/2-4 EPI
3	B 60881	50	M	0.7	0.4	0.3	38	21	190	7.1	4.5	3.6	9.2	4.5	NIL	-	-	2-4PUS/3-6 EPI
4	C 88561	40	M	0.7	0.4	0.3	15	14	169	7.6	5.4	2.2	9.3	3.3	NIL	-	-	2-4 PUS/8-10 EPI
5	A 61840	40	M	0.6	0.3	0.3	29	25	186	7.5	4.5	3	9.3	2.4	NIL	-	-	2-4 PUS/1-2 EPI
6	C 94199	30	M	0.7	0.4	0.3	31	23	131	7.9	4.8	3.1	10	2.9	NIL	-	+	2-4 PUS/2-4 EPI
7	C 94582	54	M	0.5	0.3	0.2	24	23	210	7	5	2	10.9	2.5	NIL	+	+	2.4 PUS/1-2 EPI
8	A 0656	54	F	0.5	0.3	0.2	19	20	112	6.5	3.5	3.0	9.2	3.8	NIL	-	+	0-1 PUS/0-1 EPI
9	C 24343	50	F	0.6	0.3	0.3	30	21	187	7.5	3.9	3.6	9.3	3.6	NIL	-	-	1-2 PUS/2-4 EPI
10	C 51579	45	M	0.6	0.3	0.3	29	23	161	7.6	4.1	3.5	10.5	3.6	NIL	-	-	1-2 PUS/1-2 EPI
11	C 67426	44	F	0.5	0.3	0.2	39	21	109	7.2	3.9	3.3	10.9	4	NIL	-	-	1-2 PUS/2-4 EPI
12	C 81771	42	M	0.6	0.3	0.3	23	20	189	6.7	3.9	2.8	9.6	2.7	NIL	-	++	2-4 P CELLS 2-4 E CELLS
13	B 75936	52	F	0.7	0.4	0.3	36	34	189	7.4	3.9	3.5	9.6	3.9	NIL	-	-	1-2 PUS/1-3 EPI
14	C 099559	52	F	0.7	0.2	0.5	22	24	153	6.9	3.3	3.6	9.3	4.7	NIL	-	-	2-4 PUS/1-2 EPI
15	C 43630	54	F	0.4	0.2	0.2	25	27	158	6.9	4.1	2.8	10.2	3.7	NIL	+	++	4-6 pus/4-6 EPI
16	C 098004	50	F	0.7	0.5	0.2	41	58	198	7.1	3.9	3.2	7.6	6.1	NIL	-	-	PUSPLENTY 8-10 EPI
17	D 000809	45	F	0.5	0.3	0.2	21	37	46	8.2	4.4	3.8	9.3	4.5	NIL	-	-	3-7 PUS/4-8 EPI
18	C 26069	54	F	0.6	0.4	0.2	19	15	160	8.6	5.5	3.1	10.3	4.2	NIL	-	-	3-6 PUS/3-6 EPI
19	A 24318	46	M	0.5	0.3	0.2	40	40	168	8.8	4.5	4.3	8.3	4.7	NIL	+	++	PLENTY PUS EPI PLENTY
20	C 57149	50	F	0.7	0.5	0.2	31	30	265	7.3	4.1	3.2	9.6	3.8	NIL	-	-	2-4 PUS/2-4 EPI/

Table -44 Madhumegam Specific Symptoms Before and After Treatment

S.NO	OP	AGE	SEX	BPU	APU	BPP	APP	BPD	APD	BDM	ADM	BGT	AGT
1	C 66119	48	M	+	_	_	_	+	_	+	-	+	_
2	C 91352	45	M	+	_	+	_	+	_	+	_	+	_
3	B 60881	50	M	+	_	+	+	+	+	-	-	+	+
4	C 88561	40	M	+	_	+	_	_	_	-	_	+	_
5	A 61840	40	M	+	+	+	_	+	_	+	-	+	+
6	C 94199	30	M	-	_	+	_	_	_	+	_	+	_
7	C 94582	54	M	+	_	+	_	+	_	-	_	+	_
8	A 0656	54	F	+	_	-	_	+	_	+	+	-	_
9	C 24343	50	F	-	_	+	_	_	_	+	_	+	_
10	C 51579	45	M	+	_	+	_	+	_	-	-	-	_
11	C 67426	44	F	+	_	+	_	+	+	+	_	+	_
12	C 81771	42	M	-	_	_	_	+	_	-	-	+	_
13	B 75936	52	F	+	_	_	_	+	_	+	_	+	_
14	C 099559	52	F	+	_	+	_	+	_	+	_	-	_
15	C 43630	54	F	-	_	+	_	+	_	+	-	+	+
16	C 98004	50	F	+	_	+	_	+	+	+	+	+	_
17	D 000809	45	F	+	_	+	_	+	_	_	_	+	_
18	C 26069	54	F	+	_	-	-	+	_	+	_	-	_
19	A 24318	46	M	+	_	+	_	+	+	+	_	+	_
20	C 57149	50	F	+	_	+	_	+	+	+	_	+	_

TOTAL BT:78

TOTAL AT:11

Table – 45 Madhumegam Specific Investigation Before and After Treatment

S.NO	OP	AGE	SEX	BT FBS	AT FBS	BT PPBS	AT PPBS
1	C 66119	48	M	129	92	246	134
2	C 91352	45	M	145	105	210	127
3	B 60881	50	M	163	133	212	143
4	C 88561	40	M	133	104	254	133
5	A 61840	40	M	178	110	270	149
6	C 94199	30	M	138	95	296	189
7	C 94582	54	M	180	145	256	183
8	A 0656	54	F	134	113	206	154
9	C 24343	50	F	134	128	239	145
10	C 51579	45	M	171	116	210	138
11	C 67426	44	F	160	91	180	126
12	C 81771	42	M	139	131	194	201
13	B 75936	52	F	141	101	187	136
14	C 099559	52	F	133	98	246	140
15	C 43630	54	F	200	179	270	203
16	C 098004	50	F	180	101	206	119
17	D 000809	45	F	168	110	226	135
18	C 26069	54	F	126	89	218	128
19	A 24318	46	M	174	141	300	207
20	C 57149	50	F	150	114	233	146

STATISTICAL ANALYSIS:

All collected data were entered into MS Excel software using different columns as variables and rows as patients. SPSS software was used to perform statistical analysis. Basic descriptive statistics include frequency distributions and cross-tabulations were performed. The quantity variables were expressed as Mean ± Standard Deviation and qualitative data as percentage. A probability value of <0.05 was considered to indicate as statistical significance. Paired 't' test was performed for determining the significance between before and after treatment.

TRIAL DRUG - I

Paired t test for Total bilirubin before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	1.615	.7555	12.074	P<0.0001
After treatment	20	1.185	.7513		

For Total bilirubin, the mean±standard deviation before treatment is 1.615±0.7555 and after treatment is 1.185±0.7513, which is statistically significant(p<0.0001).

Paired t test for Direct bilirubin before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	.670	.2536	7.768	P<0.0001
After treatment	20	.500	.2362		

For Direct bilirubin, the mean±standard deviation before treatment is 0.670±0.2536 and after treatment is 0.500±0.2362, which is statistically significant(p<0.0001).

Paired t test for InDirect bilirubin before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	0.950	0.5176	9.668	P<0.0001
After treatment	20	0.685	0.5354		

For InDirect bilirubin, the mean±standard deviation before treatment is 0.950±0.5176 and after treatment is 0.685±0.5354, which is statistically significant($p<0.0001$).

Paired t test for SGOT before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	44.50	13.403	9.162	P<0.0001
After treatment	20	37.15	13.204		

For SGOT, the mean±standard deviation before treatment is 44.50±13.403 and after treatment is 37.15±13.204, which is statistically significant($p<0.0001$).

Paired t test for SGPT before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	39.15	10.384	9.992	P<0.0001
After treatment	20	31.60	10.932		

For SGPT, the mean±standard deviation before treatment is 39.15± 10.384 and after treatment is 31.60±10.932, which is statistically significant($p<0.0001$).

TRIAL DRUG - II

STATISTICAL ANALYSIS:

All collected data were entered into MS Excel software using different columns as variables and rows as patients. SPSS software was used to perform statistical analysis. Basic descriptive statistics include frequency distributions and cross-tabulations were performed. The quantity variables were expressed as Mean ± Standard Deviation and qualitative data as percentage. A probability value of <0.05 was considered to indicate as statistical significance. Paired 't' test was performed for determining the significance between before and after treatment.

Paired t test for FBS before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	153.80	21.623	9.126	P<0.0001
After treatment	20	114.80	22.430		

For FBS, the mean±standard deviation before treatment is 153.80± 21.623 and after treatment is 114.80±22.430, which is statistically significant(p<0.0001).

Paired t test for PPBS before and after treatment:

Variable	Obs	Mean	Std.dev	t.value	P value
Before treatment	20	232.95	34.195	12.230	P<0.0001
After treatment	20	151.80	28.164		

For PPBS, the mean±standard deviation before treatment is 232.95± 34.195 and after treatment 151.80±28.164, which is statistically significant(p<0.0001).

The Tamil Nadu Dr. M.G.R. Medical University

69, Anna Salai, Guindy, Chennai-600 032

This Certificate is awarded to ~~Mr~~/~~Ms~~/Dr.....R. VENKADESAN.....

for participating as a ~~Resource Person~~ / Delegate in the VII Workshop

on **"Research Methodology & Biostatistics"**

for AYUSH Post-Graduates & Researchers

organized by the Department of Siddha

The Tamil Nadu Dr. M.G.R. Medical University

from 6th Feb. 2012 to 10th Feb. 2012.

DR. MAYILVAHANAN NATARAJAN
M.S.Orth. M.Ch.Orth. (L'pool) Ph.D. (Orth. Onco.) F.R.C.S. (Eng) D.Sc.
7th VICE CHANCELLOR

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READER, DEPT. OF SIDDHA

NATIONAL INSTITUTE OF SIDDHA

(An Autonomous Body under Department of AYUSH)
Ministry Of Health & Family Welfare, Government of India

Tambaram Sanatorium, Chennai - 600 047
Tel : 044-22411611 Fax : 044-22381314
E-mail : nischennaisiddha@yahoo.co.in
Website : www.nischennai.org

Name: Dr. R. VENKADESAN ..... Reg NO: 32101708
Title: Pre clinical & clinical Study on "SARAKONRAIPOO CHOORANAM" for Hepatoprotective activity in the management of kamalai noi (liver disease).

No. NIS/IEC/2011/3/16a - 24/12/2011

DECSION

Opinion of the Institutional Ethics Committee – Please Check one
✓ Approval _____ Modifications required prior to approval (Please specify one space below) _____ Disapproval Date of review: _____ Signed: _____ (Please print name) Dr.V.SUBRAMANIAN chair person (Please delee as appropriate, Chairperson, Secretary)
Modifications needed Modification given to candidate
The research proponent is hereby informed that the Institutional Ethics Committee will require the following: 1. All adverse drug reactions (ADRs) that are both serious and unexpected to be reported promptly to the IEC within 7 working days 2. The progress report to be submitted to the IEC atleast annually 3. Upon completion of the study, a final study status report needs to submitted to the IEC

K. Manickavasakam
(Dr. K. MANICKAVASAKAM)
Member secretary

IAEC PROTOCOL NO : 1248/ac/09/CPCSEA/4-16A/2011.

20/12/2011

CERTIFICATE

This is certify that the project title preclinical and clinical study on "SARAKONDRAI POO CHOORANAM" for "HEPATOPROTECTIVE ACTIVITY" in the management of kamalai noi (liver disease). **has been approved by the IAEC.**

Prof. Dr. K. Manickavasakam — **Name of Chairman/Member Secretary IAEC:**

Dr. B. Jayachandran Dare — **Name of CPCSEA nominee:**

Signature with date

Chairman/Member Secretary of IAEC:

CPCSEA nominee:

(Kindly make sure that minutes of the meeting duly signed by all the participants are maintained by Office)

NATIONAL INSTITUTE OF SIDDHA

(An Autonomous Body under Department of AYUSH)
Ministry Of Health & Family Welfare, Government of India

Tambaram Sanatorium, Chennai - 600 047
Tel : 044-22411611 Fax : 044-22381314
E-mail : nischennaisiddha@yahoo.co.in
Website : www.nischennai.org

Name: Dr.R.VENKADESAN Reg NO: 32101708
Title: preclinical & clinical study on "KANDHA CHENDURAM" for Hypoglycemic activity in the management of Madhumegam (Diabetes mellitus)

No. NIS/IEC/2011/3/166 - 24/12/2011

DECSION

Opinion of the Institutional Ethics Committee – Please Check one
✓ Approval _____ Modifications required prior to approval (Please specify one space below) _____ Disapproval Date of review: _____ Signed: _____ (Please print name) Dr.V.SUBRAMANIAN chair person (Please delee as appropriate, Chairperson, Secretary)
Modifications needed Modification given to candidate
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K. Manickavasakam
(Dr. K. MANICKAVASAKAM)
Member Secretary

IAEC PROTOCOL NO : 1248/ac/09/CPCSEA/4-16B/2011.

20/12/2011

CERTIFICATE

This is certify that the project title. Preclinical and clinical study on "KANDHA CHENDURAM" for "HYPOGLYCEMIC ACTIVITY" in the management of Madhumegam (Diabetes mellitus). **has been approved by the IAEC.**

Prof. Dr. K. Manickavasakam — **Name of Chairman/Member Secretary IAEC:**

Dr. B. Jayachandran Dare — **Name of CPCSEA nominee:**

Signature with date

Chairman/Member Secretary of IAEC:

CPCSEA nominee:

(Kindly make sure that minutes of the meeting duly signed by all the participants are maintained by Office)

CERTIFICATE

This is to certify that the project title: "Preclinical study on "Sarakonrai Poo Chooranam" for Hepatoprotective Activity in the management of Kamalai. (Liver disease) " has been approved by the IAEC with the reference number. XIII/VELS/PCOL/42/2000/CPCSEA/IAEC/08.08.12.

Name of Member Secretary IAEC:

Dr. J. Anbu

Name of CPCSEA nominee:

Dr. K. Sadhasivan Pillai

Signature with date

J. Anbu 08/08/12

Member Secretary of IAEC

Dr. J.ANBU, M.Pharm., Ph.D., D.M.L.T., MBA.
Professor & Head
Department of Pharmacology & Toxicology
School of Pharmaceutical Sciences
Vels University
Pallavaram, Chennai-600 117.

CERTIFICATE

This is to certify that the project title: "Preclinical study on "Kandha Chenduram" for Hypoglycemic Activity in the management of Madhumegam (Diabetes mellitus)" has been approved by the IAEC with the reference number. XIII/VELS/PCOL/43/2000/CPCSEA/IAEC/08.08.12.

Name of Member Secretary IAEC:

Dr. J. Anbu

Name of CPCSEA nominee:

Dr. K. Sadhasivan Pillai

Signature with date

J. Anbu 08/08/12

Member Secretary of IAEC

Dr. J.ANBU, M.Pharm., Ph.D., D.M.L.T.,MBA.
Professor & Head
Department of Pharmacology & Toxicology
School of Pharmaceutical Sciences
Vels University
Pallavaram. Chennai-600 117.

SOPHISTICATED ANALYTICAL INSTRUMENT FACILITY
INDIAN INSTITUTE OF TECHNOLOGY, MADRAS
Chennai - 600 036. INDIA

CERTIFICATE

Certified that herbo-mineral drugs **KANDHA CHENDURAM & SARAKONRAI POO CHOORANAM** formulated by **Dr.R.VENKADESAN** III Year M.D(S) Department of Gunapadam, National Institute of Siddha, Tambaram Sanatorium were analysed (quantitative) by ICP-OES, HR-SEM, GC-MS and Physico chemical Analysis Methods at SAIF, IITM, Chennai-600 036, during October 2012.

Dr. R. MURUGESAN
Scientific Officer Gr.-I
Sophisticated Analytical Instrument Facility
Indian Institute of Technology, Madras
Chennai-600 036

Phone : 91-44-2257 4935 Fax : 91-44-2257 0545, 2257 0509
e-mail : saif@iitm.ac.in http://www.saif.iitm.ac.in

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III. சிகிச்சா ரத்னதீபம்

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XIV. குணபாடம் (தாது-சீவ வகுப்பு), மருத்துவர் ரா.தியாகராசன், பக்கம்: 128, 129

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மருத்துவர் க.ச.முருகேச முதலியார்

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XXI. தேரையர் காப்பியம்

XXII. **Author affliations:**

Departamento de Farmacologia, Hospital de Clínicas de Porto Alegre, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

Departamento de Oftalmologia e Otorrinolaringologia, Hospital de Clínicas de Porto Alegre, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

Departamento de MedicinaInterna, Hospital de Clínicas de Porto Alegre, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

Address correspondence to Claudio C. Teixeira, MD, Departamento de Farmacologia, ICBS, UFRGS, RuaSarmentoLeite, 550, CEP 90046-900, Porto Alegre, RS, Brazil. E-mail: clauct@vortex.ufrgs.br

Syzygiumcumini **(L.)Skeels in the Treatment of Type 2 Diabetes Results of a randomized, double-blind, double-dummy, controlled trial**

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XXIII. குணபாடம் - மூலிகை, மருத்துவர் க.ச.முருகேச முதலியார், வகுப்பு- பக்கம்: 34

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XXV. குணபாடம் - மூலிகை, மருத்துவர் க.ச.முருகேச முதலியார், வகுப்பு- பக்கம்: 158-160

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Antidiabetic Activity of ethanol extract of Citrus medica L. peels in streptozotocin induced diabetic rats

Alka O. Kabra, Ganesh B. Bairagi, Ravi S. Wanare

Department of Pharmacology, SudhakarraoNaik Institute of Pharmacy, Pusad, Yavatmal, Maharshtra, India 445204

Received on:10-12-2011; Revised on: 15-01-2012; Accepted on:12-02-2012

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XXVIII. அகத்தியமுனிவர்

XXIX. குருநாடி

XXX. யூகி வைத்திய சிந்தாமணி

XXXI. அகக்தியர் 1200

XXXII. யூகி வைத்திய சிந்தாமணி

XXXIII. திருமூலர்

XXXIV. குருநாடி

XXXV. நாடிநூல்

XXXVI. திருமூலர்

XXXVII. தேரன் மருத்து பாரதம்

XXXVIII. யூகி வைத்திய சிந்தாமணி

XXXIX. அகத்தியமுனிவர் கர்ம காண்டம்

XL. யூகி வைத்தியசிந்தாமணி

XLI. தேரையர் வாகடம்

XLII. யூகி வைத்தியசிந்தாமணி

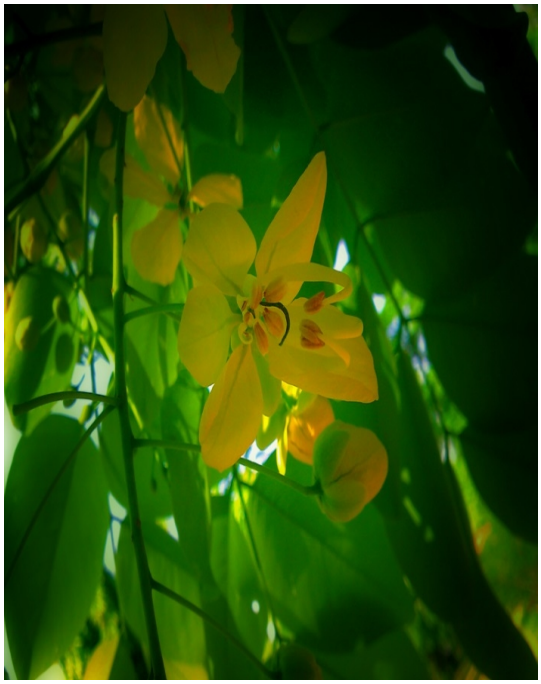
XLIII. திருமூலர் 600

XLIV. யூகி வைத்தியசிந்தாமணி

XLV. யூகி வைத்தியசிந்தாமணி

XLVI. பதிணென் சித்தர் நாடி நூல்

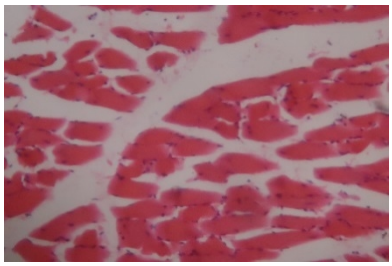
Cassia fistula. Linn



SARAKONRAIPOO CHOORANAM

SUBACUTE TOXICITY STUDY

Bone



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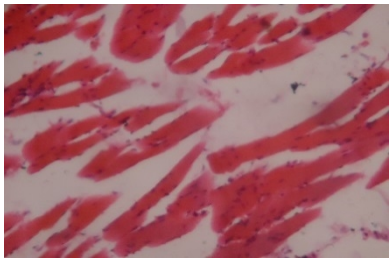

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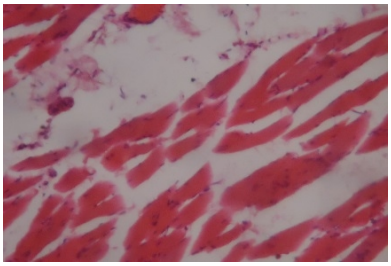

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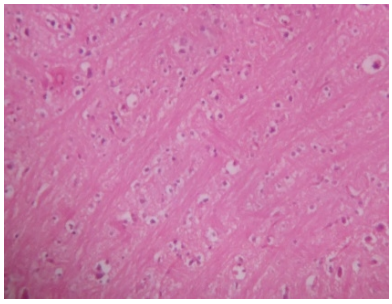

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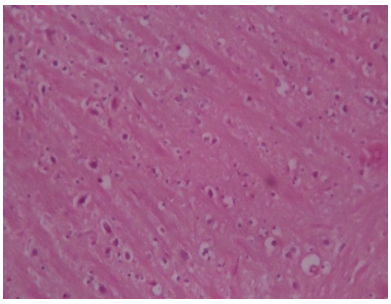

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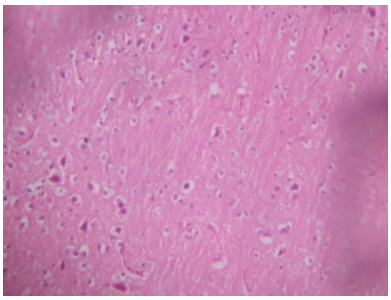

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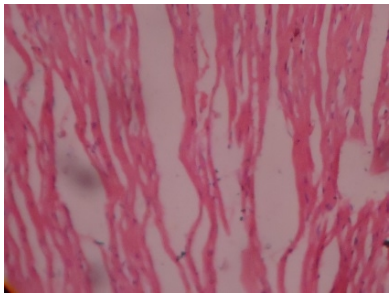

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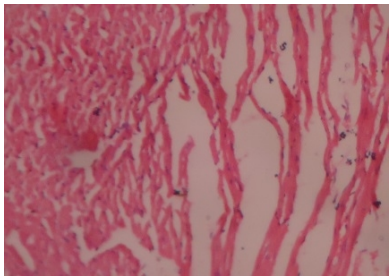

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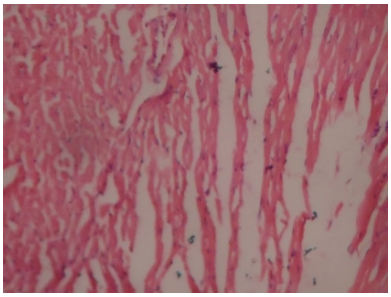

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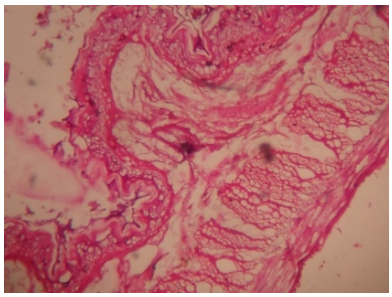

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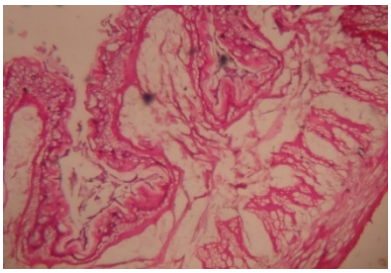

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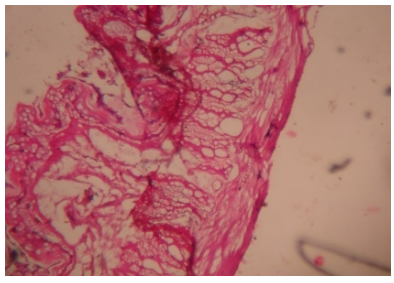

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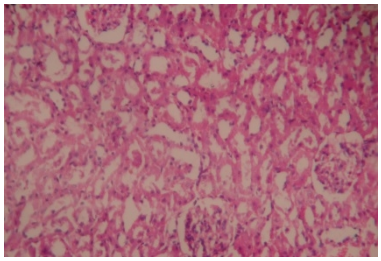

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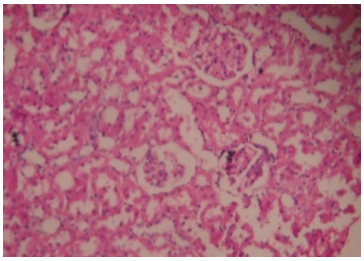

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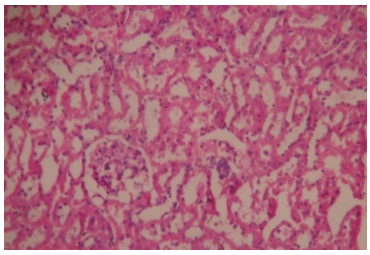

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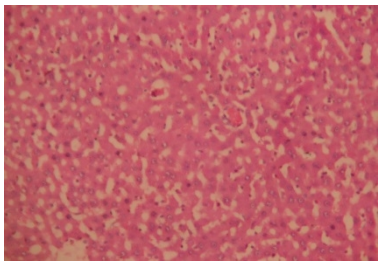

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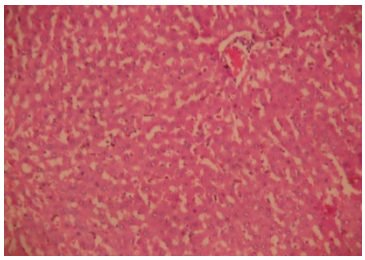

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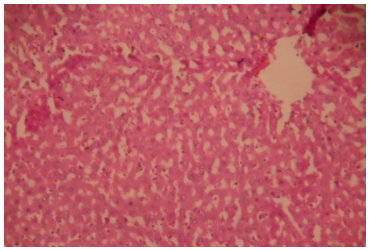

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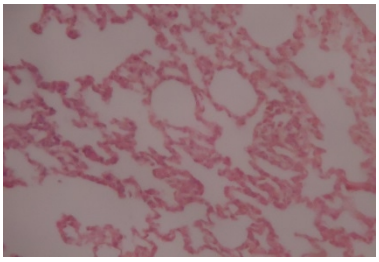

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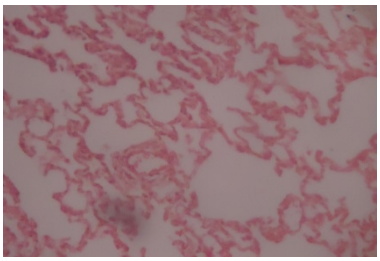

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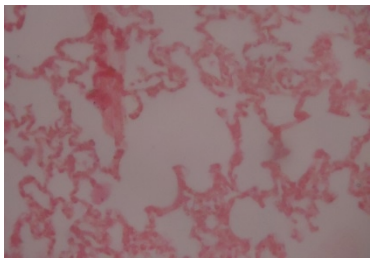

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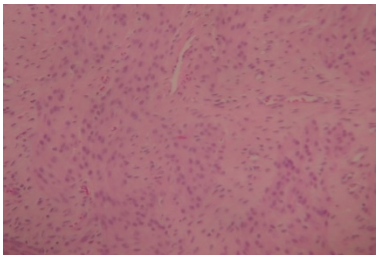

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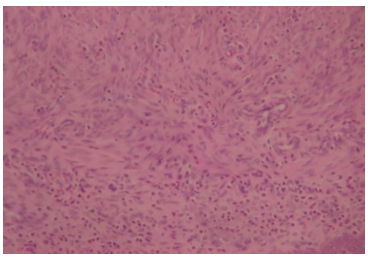

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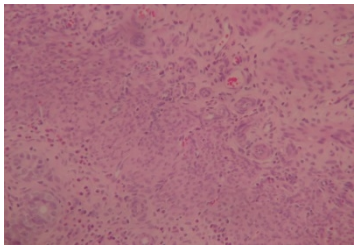

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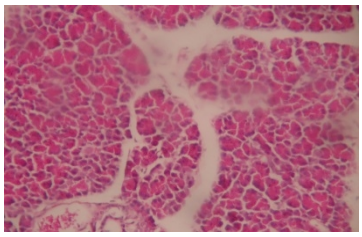
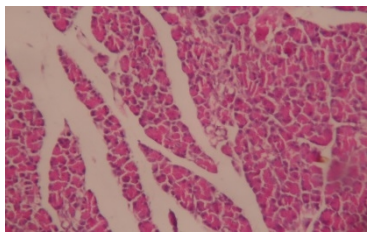
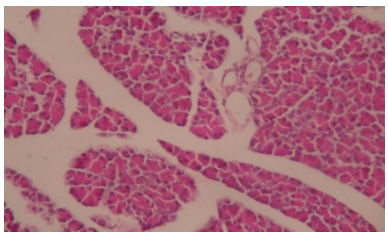

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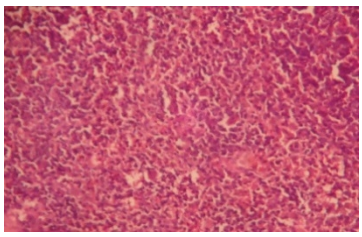
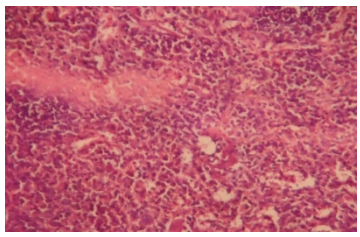
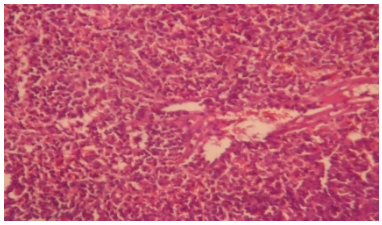

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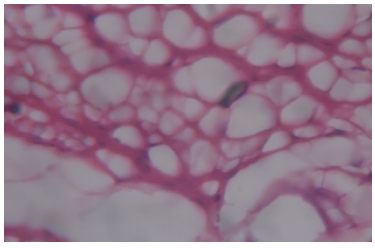
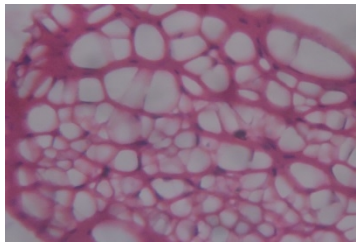
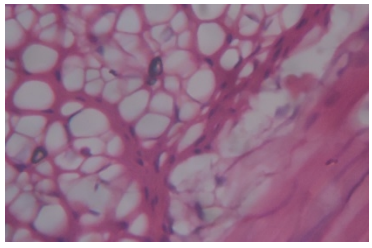

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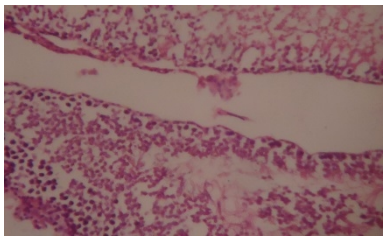
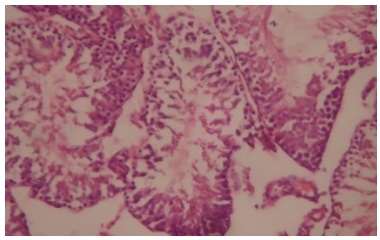
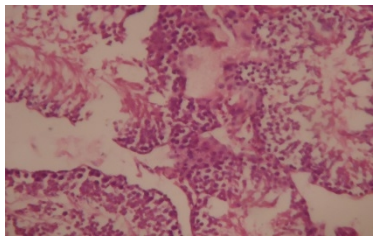

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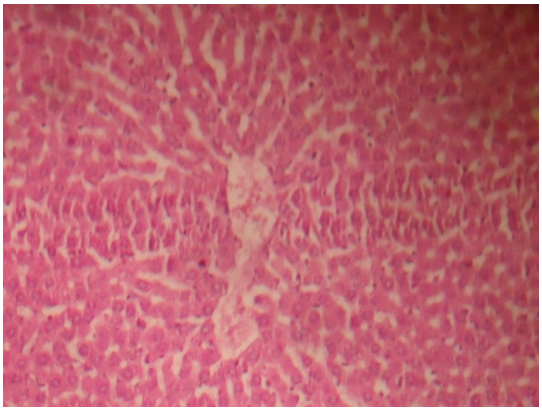
HEPATOPROTECTIVE ACTIVITY OF SARAKONRAIPOO CHOORANAM

Normal



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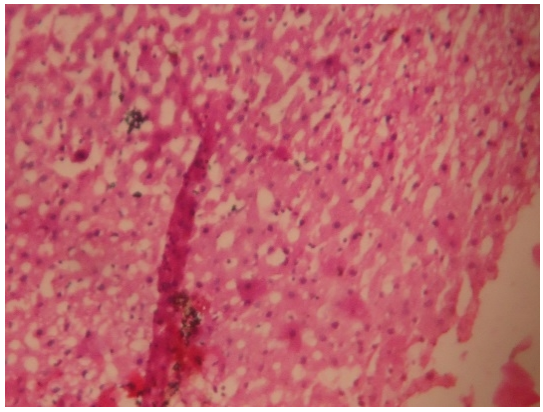

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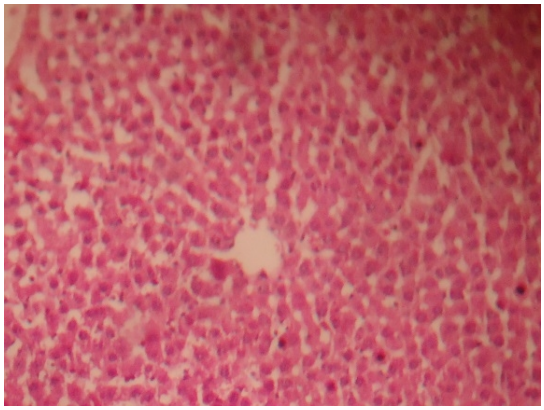

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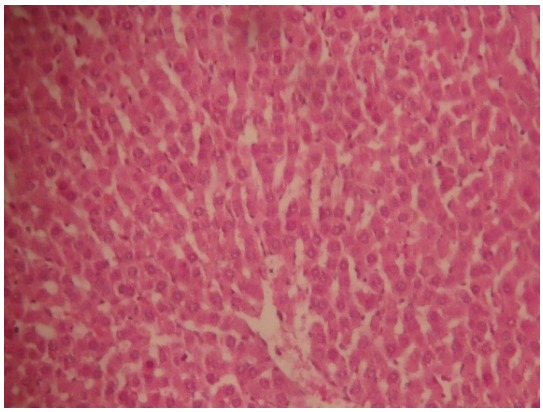

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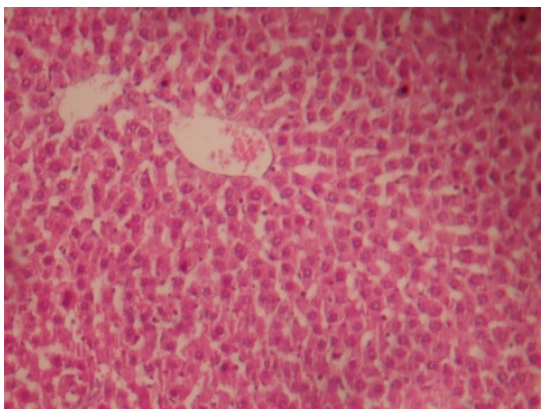


KANDHAM

BEFOREPURIFICATION

PURIFICATIONPROCESS:

AFTER PURIFICATION

Wedelia chinensis

Aloe vera

Syzygium cumini (Bark)

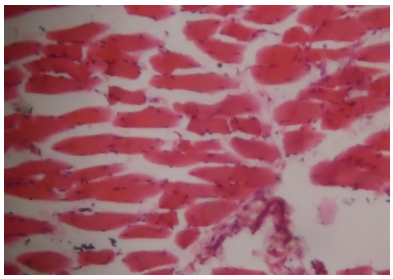
Ficus religiosa (Bark)

Citrus limon

KANDHA CHENDURAM

SUB ACUTE TOXICITY STUDY

BONE



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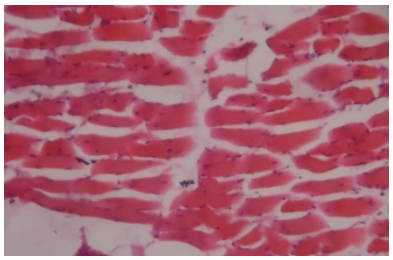

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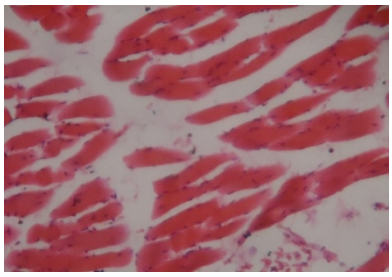

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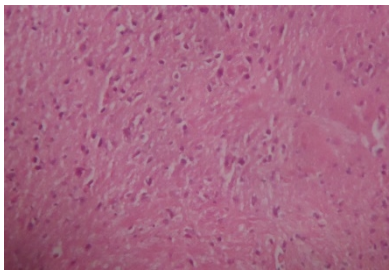
BRAIN



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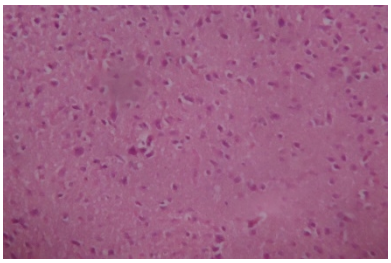

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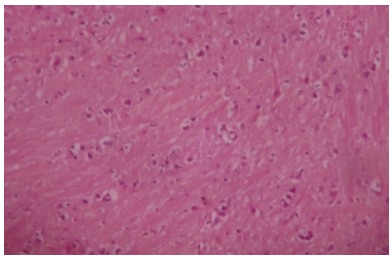

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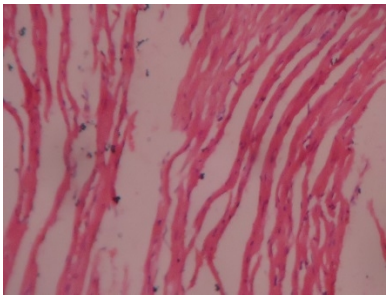

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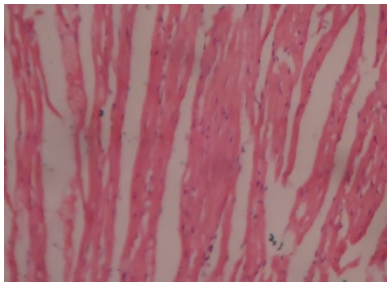

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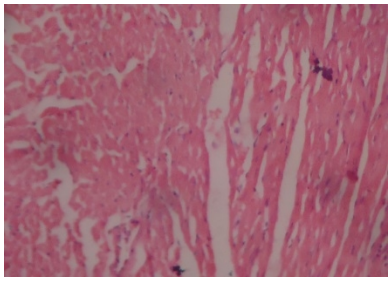

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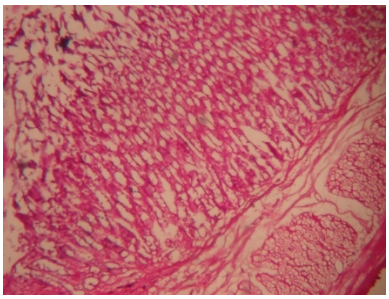

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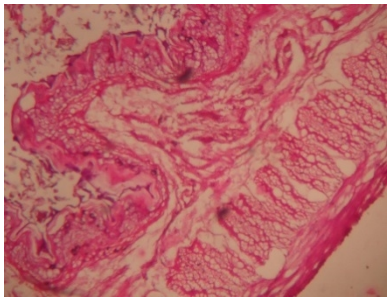

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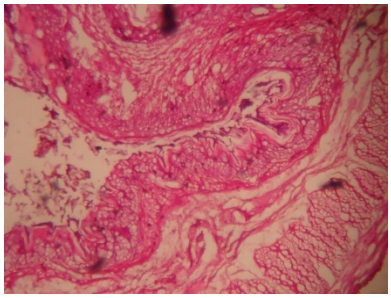

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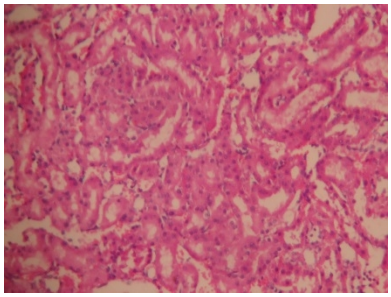

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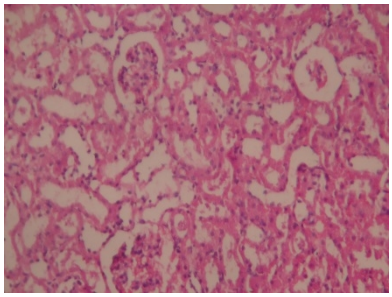

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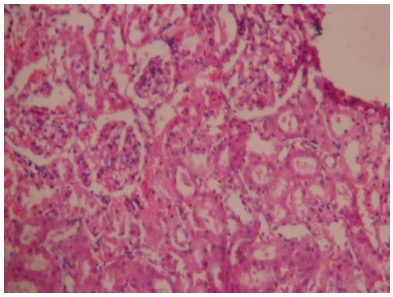

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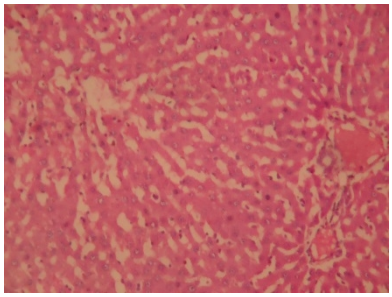

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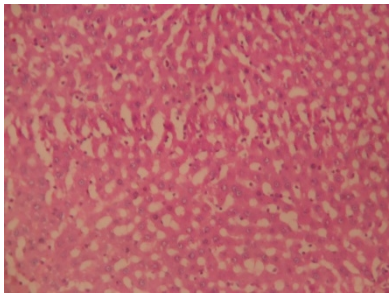

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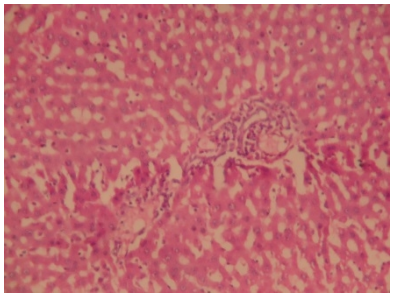

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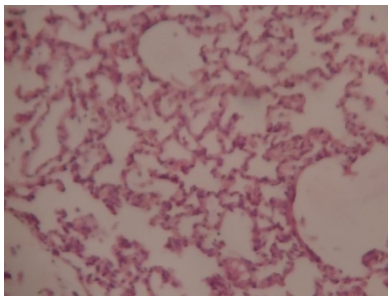

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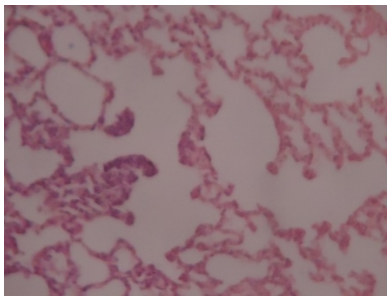

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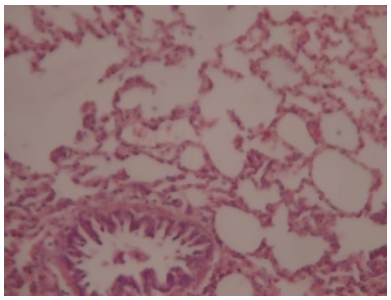

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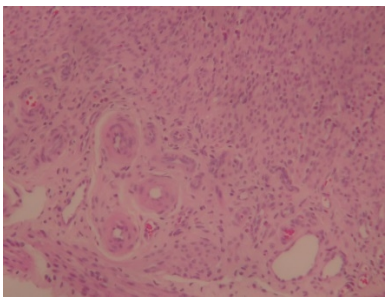

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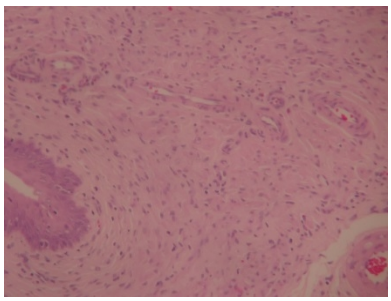

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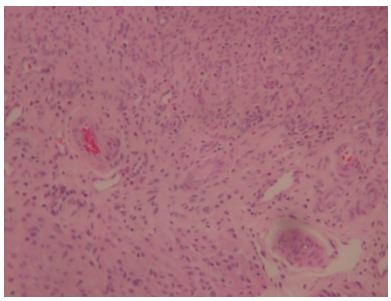

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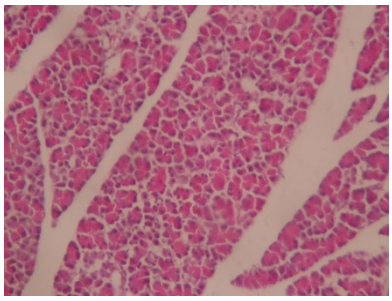

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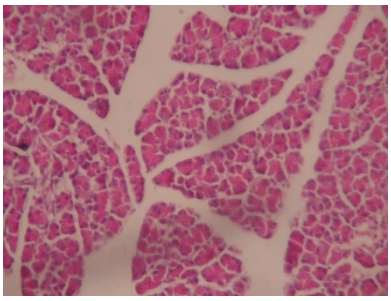

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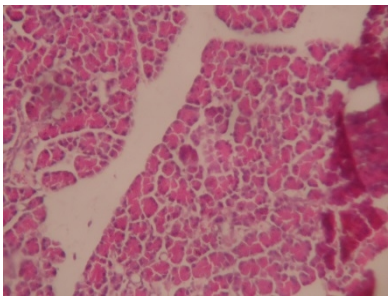

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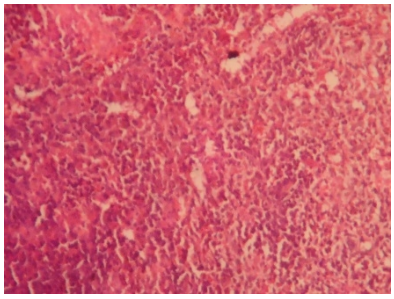

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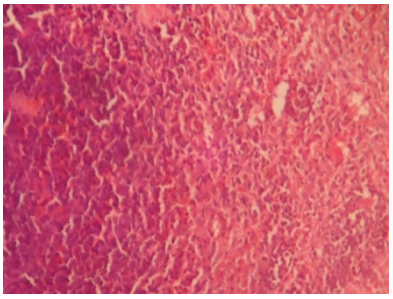

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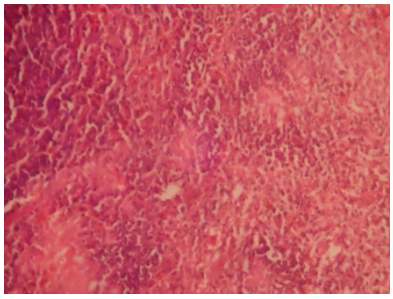

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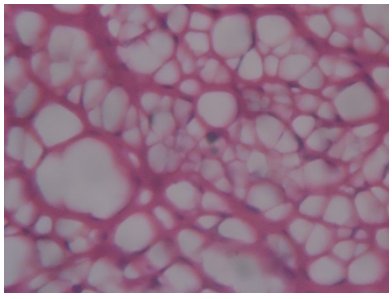

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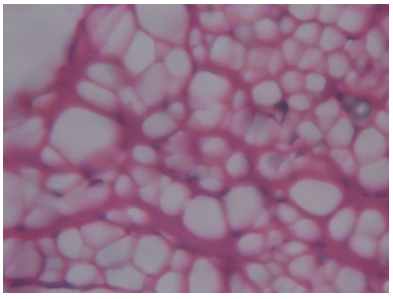

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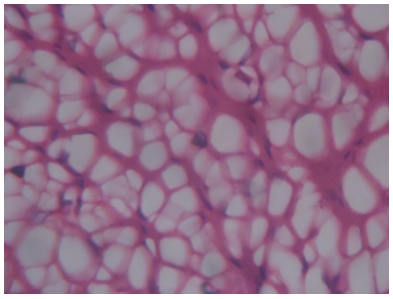

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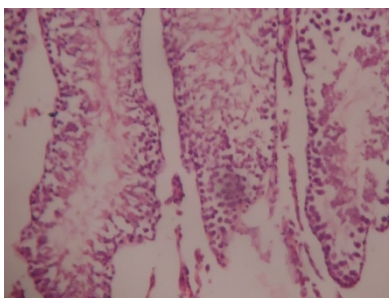

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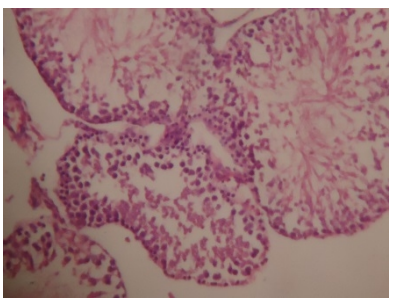

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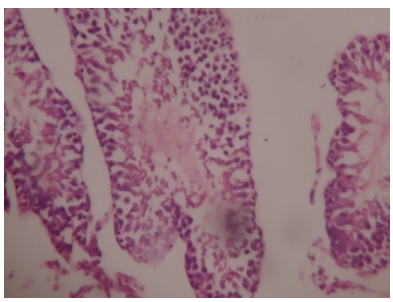

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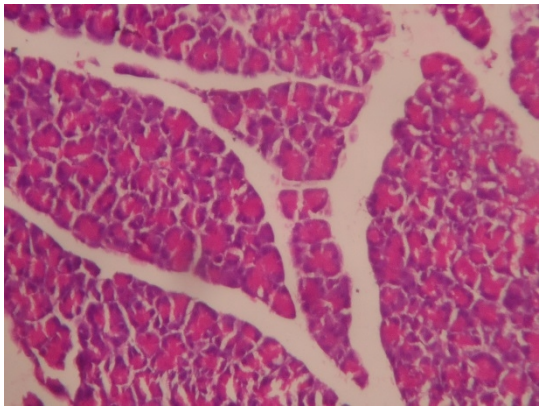
HYPOGLYCEMIC ACTIVITY OF KANDHA CHENDURAM

Group I



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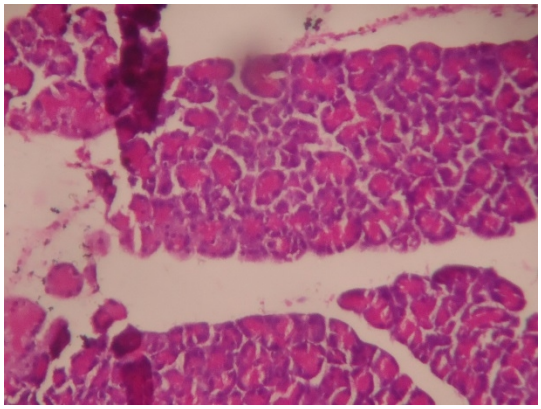

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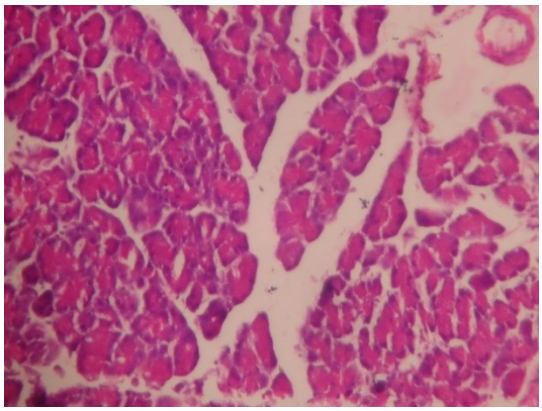
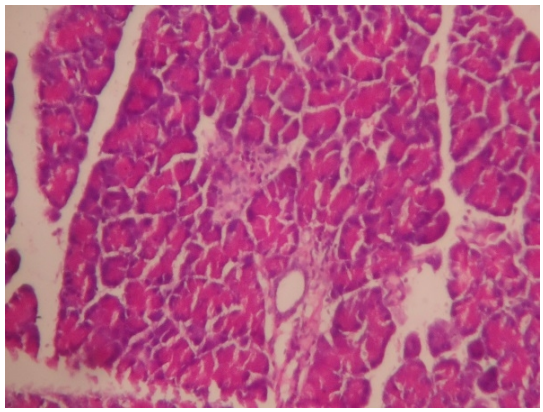


Group IV



Group V